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The Radio Amateur's Journal

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For further information, check number 22 on page 126

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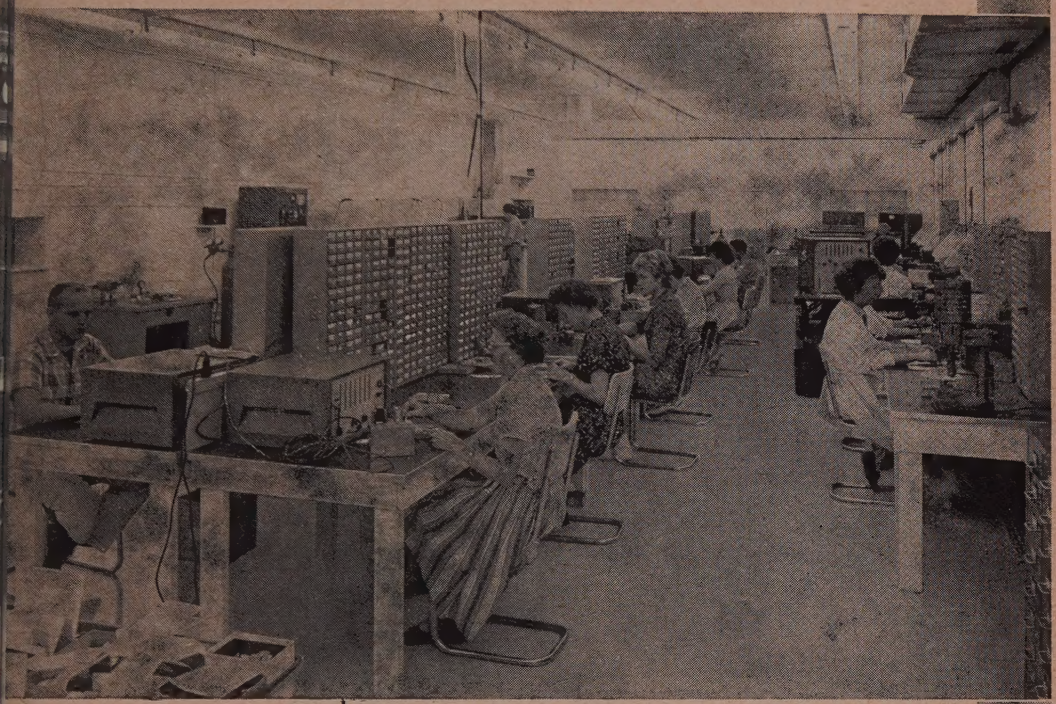

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Third Overtone, PR Type Z-9A, 24,000 to 24,666 and 25,000 to 27,000 Kc., ± 3 Kc. ..$3.95 Net

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Citizens Band, PR Type Z-9R .005% .....$2.95 Net

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Since 1934, amateurs everywhere have applauded the fine dependability, high output, economical operation, and hair-line accuracy of PR Crystals. These qualities are assured by precision workmanship at every stage in manufacture. The photograph above shows a section of the Finishing Room, where PRs are plated, assembled, soldered, and boxed. In the foreground are two of the twenty-two fine Berkley Frequency Meters used to check the exact frequency of every PR Crystal. These meters have an accuracy of better than one part in ten million! Put PRs in your rig today. You'll have the finest precision frequency control that money can buy. Your jobber has them for you.

PR Crystals

Since 1934

USE PR AND KNOW WHERE YOU ARE

PETERSEN RADIO COMPANY, INC.
COUNCIL BLUFFS, U.S.A.

For further information, check number 1, on page 126

Are you ready to move up to an HT-32B

Somewhere along the line, about one of 25 amateurs reaches a "point of no return" in pursuit of this unique and wonderful activity we call ham radio.

Up to this point, his interest, his technical skills and experience have grown and broadened by leaps and bounds. He has studied or experimented with a variety of equipment — enough to know what to expect, and what he personally wants in ultimate performance.

Beyond it, average performance or the absence of needed features no longer are an inconvenience. *They are intolerable.* Beyond it, he will settle for nothing less than an uncompromising leader. The best.

The HT-32B transmitter was designed, frankly and specifically, for the one-in-twenty-five. Like anything exceptionally worthwhile it costs more. But if you are ready to own it, you will know in advance why it is the *least extravagant investment you ever made.*

The incomparable
HT-32B
transmitter
$725.00
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- **Hallicrafters exclusively** — complete amateur coverage capability, 80 meters through 10 meters, without changing crystals.
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For complete specifications write today.

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For further information, check number 17, on page 126

CQ

The Radio Amateur's Journal

Vol. 19, No. 1 January 1963

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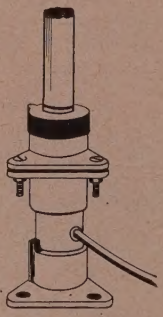
IF YOUR CHOICE IS A VERTICAL

Mosley will help you choose an antenna to fit your personal needs.

V-4-8 EQUIVALENT TO SEPARATE 1/4 WAVE-LENGTH VERTICALS!

For 40 and 80 meters, this heavy duty 100% rust proof antenna easily handles 1 KW (AM). The V-4-8 comes complete with cycolac base mount, polyethylene guy rope and hardware.

Amateur Net, $85.00.



Base for V-4-8 and V-5

V-5 MEETS HIGH AIR FORCE REQUIREMENTS!

Work 10, 15, 20, 40, and 80 with one antenna... one RG/8U feedline. The V-5 is 100% rust proof and performs brilliantly on each of 5 bands. Handles power of 1 KW to the antenna. Supplied complete with polyethylene guy rope, heavy duty base with internal coax fitting and all necessary hardware.

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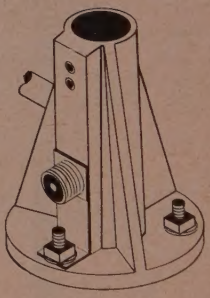
V-4-6 HIGH IN PERFORMANCE, LOW IN PRICE!

No bandswitching is necessary on this excellent DX antenna. Exclusive design provides low SWR with response exceptionally flat across full width of each band. Weather proof traps ...easy to assemble... the most popular vertical ever built for 10, 15, 20 and 40 meter operation.

Amateur Net, $27.95.



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Mosley Electronics Inc.

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Please send me detailed specificat
performance ratings and the name o
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Mosley antennas.

☐ Model V-4-6 ☐ Model V-4-8
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Name.....
Address .....
City ..... Zone.....State.

For further information, check number 37, on page 126

measure the performance...

VOX & Push-To-Talk Circuitry.

Output Power—Two-tone SSB and CW—50 watts at 10 meters to 65 watts at 80 meters for conservatively rated input of 90 watts DC, 130 watts P.E.P. AM is 25% of SSB/CW values.

3 element Pi network variable output circuit (40 to 80 ohms).

5 position switch for internal or external VFO plus three crystal control frequencies suitable for Novice, MARS, C.A.P., etc.

Built-in antenna changeover, VOX and break-in keying.

Amateur Bands Covered—80, 40, 20, 15 and 10 meters. 160 meter band position provided for use with optional kit.

Complete passband coupler design used throughout low-level stages provides minimum 1 MC bandwidth at the following frequency ranges: 3.2 to 4.2 MC; 6.9 to 7.9 MC; 13.8 to 14.8 MC; 20.8 to 21.8 MC; 27.0 to 31.0 MC.

Stack up the features!

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...and we are sure that you will agree that despite the new price tag we have had to put on the FABULOUS HX-50, it still gives you more dollar-for-dollar value than any other transmitter in the market today! The '50 is crammed full of outstanding features to deliver the performance you have always wanted—but have never been able to get in this price range.

ONLY $449.50 AMATEUR NET

Now Available! 160 Meter Band Kit for only $11.00. Or, if you prefer, this plus feature can be wired right into the unit on special order for an additional charge. NOTE: The Hammarlund HX-50 is the only commercially manufactured Amateur transmitter that presently provides 160 meter band capability.

Don't wait. See the FABULOUS '50 at your authorized Hammarlund Distributor—or send for complete technical data on the transmitter that is still "THE BEST BUY IN ITS CLASS."

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AMATEUR RADIO EQUIPMENT • COMMERCIAL COMMUNICATIONS EQUIPMENT • THE OUTERCOM 2-WAY RADIO
VARIABLE AIR CAPACITORS • SUPERVISORY REMOTE CONTROL SYSTEMS

For further information, check number 7, on page 126

COMING SOON!

Galaxy 300

SSB TRANSCEIVER

YOU CAN BUY IT FOR $300.00 WIRED, (APPROX.) MADE IN U.S.A. BY A LEADING HAM EQUIPMENT MFG.

SSB
80-40-20 METERS

GALAXY 300 — provides a complete select sideband transceiver station, SSB or AM, f or mobile (mobile mount to be available).

GALAXY 300 — POWER is rated at an inpu 300 watts SSB (PEP), and 75 watts AM — put of 200 watts SSB (PEP), and 50 watts External power required is 800 VDC @ Ma., negative 120 VDC @ 10 Ma., and 1 VDC/AC @ 8 A . . . full power. (AC su to be available).

GALAXY 300 — RECEIVING sensitivity o microvolt on all bands, product detector, lectable sideband, separate AF and RF g controls, audio derived "S" meter and action.

GALAXY 300 — TRANSMITS selectable si band, or AM with inserted carrier, inclu PTT operation (or VOX with accessory un carrier suppression 50 DB, unwanted sideba suppression 40 DB, adjustable Pi-network 52 Ohms with 2:1 SWR range, Hi-Z mike inp

GALAXY 300 — FULL PANEL CONTROL functions, main tuning (200 Kc. each ban tune-operate, audio gain, RF gain, mike ga carrier balance, driver tune, sideband select PA tune, PA load, bandswitch, calibrati adjust.

GALAXY 300 — TUBE COMPLIMENT has tube functions, plus two regulator tubes, ha some — rugged, heavy cast aluminum panel iridite treated, extrusions and knobs are bla perforated steel case with hinged lid — high, 14" wide, 13" deep, wt. approx. 19 l

GALAXY 300 — EXTRAS, such as crystal tice filter with 2.7 Kc. bandpass and 3:1 sha factor @ 6 DB point, illuminated meter a dial, adjustable calibration hairline, dual spe tuning (72:1 slow, 12:1 fast) with dual pla tary and anti-backlash gear system, inter socket for plug-in VOX-QT unit (to be availa as an accessory).

SEE THE BIG STORY—
SAME PAGE
FEBRUARY CQ
READY TO ORDER?

For further information, check number 6, on page 126

ZERO BIAS

RECIPROCAL Licensing Bill, S. 2361 is now history!

Introduced early during the 87th Congress by Senator Barry Goldwater of Arizona and the late Senator Andrew Schoeppel of Kansas, it was immediately referred to The Interstate and Foreign Commerce Committee where it remained for the duration of the session.

Since S. 2361 was designed to alter the Communications Act, allowing properly qualified non-citizens to operate amateur stations in the United States, the Commerce Committee requested that interested governmental agencies comment on the feasibility of such a Bill. Unfortunately, these comments were received too late to prompt action by the Committee, but it should be of interest that the ice has now been broken, leaving a clearer path for the re-introduction of the Bill this year. At this writing, these observations have not been made public but it is believed that no specific objections were lodged.

S. 2361 was probably born when the Liga Mexicana Radio Experimentores (L.M.R.E.) desperately tried to preserve the licensing of United States amateurs in Mexico. Up until 1961, United States amateurs were allowed the privilege of receiving a Mexican license, without the same neighborly gesture offered in return. As a result, a great deal of antagonism grew, and under certain pressures, the Mexican Government had no alternative but rescind amateur licensing to United States citizens.

Brought to the attention of Senator Goldwater (Arizona being a neighboring State to Mexico) he consented to introduce the Reciprocal Licensing Bill on the floor of the Senate.

Mr. Goldwater's statement on the introduction of this Bill on August 1, 1961 made it quite clear that good-will and better foreign relations would be the only result of the passage of S. 2361.[1]

We were therefore very surprised to learn that the Bill has received opposition from amateur ranks! The Anti-Communist Amateur Radio Network (ACARN), an absurd group of "Super Patriots" who have threatened to start their own national radio "club" to replace the League and who, at the drop of a hat, are ready to insinuate that someone is "pink" if their views do not agree with that of ACARN, believe the passage of S. 2361 will do nothing but bring espionage agents to our shores. Disguised as radio amateurs, these tourists will, according to ACARN, bring with them hidden transmitters, collapsible beams, and perched in dusty attics, send secret messages abroad.

It would indeed, be a sad situation if the Reciprocal Licensing Bill were transformed to a controversial political issue, which of course it is not. Being a radio amateur is certainly not a prerequisite for being an enemy agent!

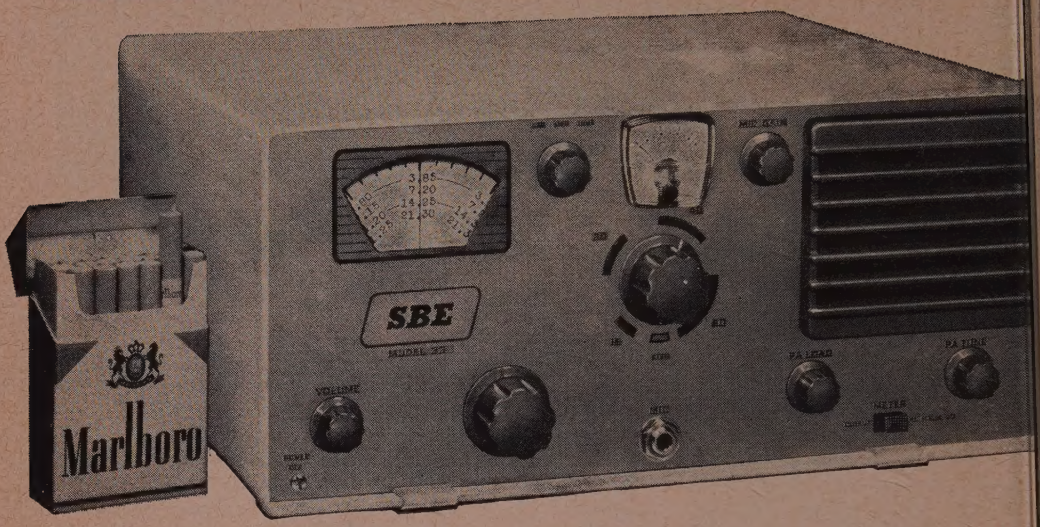
S. 2361 will receive, if and when it is reintroduced this coming session, a new number designation. It will, no doubt, again be sent to The Interstate and Foreign Commerce Committee, where again comments will be solicited from interested agencies. If these departments have not altered their opinion of the Bill it is likely that the Committee will receive prompt replies. If this be the case, the Bill will be forwarded to the Subcommittee on Communications, headed by Senator John O. Pastore of Rhode Island. Should Senator Pastore's group find the Bill attractive it will then be presented to the entire Commerce Committee and with a favorable vote there it will be passed to Congress. If this seems like quite a bit of red tape—it is—but this is the way our government runs and it has been working out pretty good so far. Remember, this is a change in the Communications Act—*not* just a change in amateur regulations which the FCC can execute as they wish.

But first things first! We hope that Senator Goldwater will find time during his busy schedule to consider re-introducing the Bill. We hope Chairman Magnussen will expedite the Bill in Committee. We hope the Federal agencies will speed their replies. We hope the Congress will see fit to unanimously pass the Bill, and above all, we hope that amateurs will, with intelligent, informative letters, "pepper" everyone involved, indicating their desire to see the Bill passed.

We know that radio amateurs, whatever their nationality, exchange more good-will than any other media. Now we have to convince those who are not aware of this important implication.

[1]See *CQ*, p. 7, Oct. 1961 for Sen. Goldwater's comments.

SB 33 ONE OF THE BIGGEST VALUES EVE



Entirely New! Outstanding! Dynamic

SB-33 transceiver . . . dynamic product of solid-state electronics and advance electro-mechanical design! Exceptionally small—less than one-half cub foot **including built-in AC supply** and weighing only 15 pounds! **Powerf** . . . 135 watts P.E.P. input. **Four-bands,** 80-40-20-15 meters. Upper or low sideband selectable by panel switch **and without carrier or dial shift!** Colli mechanical filter. Very low frequency drift. Check the specs . . . compa prices. **This has to be one of the biggest values ever! Available at your SB distributor during February 1963. Write today for complete specification**

SIZE: 5½"H, 11¾"W, 10¼"D. Weight 15# (approx.)
FREQUENCY RANGE: Band 1: 3.8-4.0 mc.
Band 2: 7.15-7.35 mc. Band 3: 14.2-14.4 mc.
Band 4: 21.25-21.45 mc.

TRANSMITTER

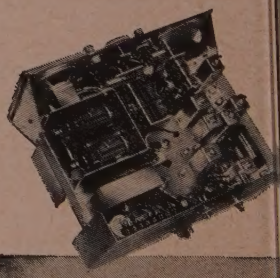
POWER INPUT: 135 watts P.E.P. max. (Speech waveform.)
DISTORTION PRODUCTS: Down at least 25 db.
CARRIER SUPPRESSION: —50 db.
SIDEBAND SELECTION: Upper or lower sideband selectable by panel switch.
UNWANTED SIDEBAND: —40 db.
OUTPUT IMPEDANCE: 40-100 ohms unbalanced.

RECEIVER

SENSITIVITY: Better than 1 uV for 10 db signal/noise ratio.
SELECTIVITY: 2.1 kc @ 6 db. 5.3 kc @ 60 db.
SPURIOUS RESPONSE: Images and I-F response down at least 40 db.
STABILITY: Less than 100 cps drift in any 30 minute period in any normal ambient temp. condition.
AUDIO OUTPUT: 2.0 watts @ 10% distortion.
TUNING RATE: 30 kc per revolution.
POWER SUPPLY: 117VAC POWER SUPPLY IS BUILT IN.
POWER CONSUMPTION: AC operation. Receive 35 watts. Transmit: 165 watts (single tone).
DC operation through vibrator or transistorized inverter.

TUBE AND SEMI-CONDUCTOR COMPLEMENT:
2—PL-500 beam power tetrodes, **PA.** 1—12DQ7 driver.
19—transistors, 13—diodes. 1—zener diode.

OPTIONS: Several options are separately available including VOX and Calibrator unit with provisions for mounting on rear of transceiver. Internal power supply provides operating power. Rear connections are brought out for linear amplifier



389.50

LOCKING-TYPE MOBILE MOUNTING BASE 12.50
SPECIAL INVERTER, 12V DC-115V AC . . . 59.50

SBE

Sideband Engineers, Inc.
Rancho Sante Fe, Californi

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your choice of 2 GREAT EICO® TRANSMITTERS...

designed by Hams... for Hams...

to the highest Ham standards

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Kit $79.95 Wired $119.95
*U.S. Pat. #D-184,776
"Top quality"—ELECTRONIC KITS GUIDE
Ideal for veteran or novice. "Clean" 90W CW, 65W AM-phone with EXT plate modulation. 80 through 10 meters.

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"Compact; well-planned layout. Clean-sounding, absolutely hum-free carrier; stable." — ELECTRONICS WORLD.
Perfect for novice or advanced ham needing low-power standby rig. "Clean" 60W CW, 50W AM-phone with EXT plate modulation. 80 through 10 meters.

TRANSISTOR CODE PRACTICE OSCILLATOR #706
Complete with battery. Select variable tone, flashing light, or both together. Phone jack for private use. Efficient speaker: clean loud signals.
Kit $8.95 Wired $12.95

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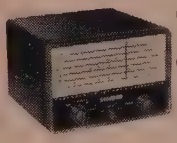
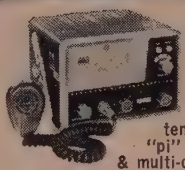


VARIABLE FREQUENCY OSCILLATOR (SELF-POWERED) #722
Approaches crystal stability. 80 through 10 meters.
Kit $44.95
Wired $59.95



CITIZENS BAND TRANSCEIVERS 770 Series U.S. Pat.
Superhet; pre-aligned xmitter osc; match antennas by variable "pi" network. Single & multi-channel models.
From Kit $79.95 Wired $109.95

HIGH-LEVEL UNIVERSAL MODULATOR-DRIVER #730
Kit $49.95 Wired $79.95
Delivers 50W undistorted audio for phone operation. Can plate-modulate transmitters having RF inputs up to 100W. Unique over-modulation indicator. Cover E-5 $4.50.

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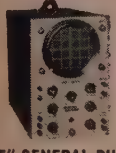
Kit $29.95 Wired $49.95
Includes complete set of coils for full band coverage. Continuous coverage 400 kc to 250 mc. 500 ua meter.

PEAK-TO-PEAK VTVM #232 *U. S. Pat.
& exclusive *UNI-PROBE®
Kit $29.95
Wired $49.95
VACUUM TUBE VOLTMETER #221
Kit $25.95 Wired $39.95



DC-5MC LAB & TV 5" OSCILLOSCOPE #460
Kit $79.95
Wired $129.50
5" GENERAL PURPOSE SCOPE #427
Kit $69.95 Wired $109.95

DYNAMIC CONDUCTANCE TUBE & TRANSISTOR TESTER #666
Kit $69.95 Wired $109.95
TUBE TESTER #625
Kit $34.95 Wired $49.95

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Kit $26.95
Wired $39.95
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Kit $69.95 Wired $119.95

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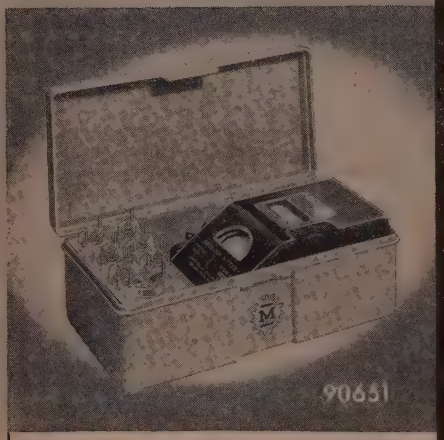
For further information, check number 9, on page 126

Designed for

M

Application



The No. 90651

GRID DIP METER

The No. 90651 MILLEN GRID DIP METER is compact and completely self contained. The AC power supply is of the "transformer" type. The drum dial has seven calibrated uniform length scales from 1.5 MC to 300 MC plus an arbitrary scale for use with the 4 additional inductors available to extend the range to 220 kc. Internal terminal strip permits battery operation for antenna measurement.

JAMES MILLEN MFG. CO., INC.

MAIN OFFICE AND FACTORY

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M

G-Whiz

Editor, *CQ*:

Re; phone patches. . . . Operating from a Countr whose license will not allow patches, I offer unbiase comments. What is all the commotion about? What wrong with patches? Whether they be for emergency c just for Mrs. B to speak to her long departed Son, c even Mrs. A and Mr. C inquiring after Aunt Emma cat; surely this patch takes up no more room than an other QSO, and certainly causes less QRM than the so called DX operator, who stay on one frequency all da and requests for calls extending five or even ten KC either side of his transmitting frequency.

The DX "Walla's" are probably pulling hairs out a this stage, but let them remember that ham radio is fo every license holder to enjoy, in any way he pleases providing he abides by his own country's rules.

Regarding the phrase that seems to upset many hams *e.g.*, "Phone Patches," a clear channel would be ap preciated. Well what's wrong with this? Providing thi fellow requesting this does not come up on a frequency already occupied. Surely all he is doing is announcing that the frequency is being used whilst he contacts the party needed on the land line. After all when one is in QSO, either local or DX one appreciates a clear channel and should another station start to call CQ during perhaps a short silence on frequency, a request for QSY is usually accepted. I think all hams should weigh the pro's and cons and also improve their own operating technique before condemning other people; I refer to the operators who persist in making long calls to a station who is listening to another stations final.

Many U.S. hams will say "This guy should listen over here, then he would change his mind." Well I have done just that, many times in 1960 and also in 1962 and I still cannot see the outcry against Phone Patches.

Should John Bull ever allow them in G-Land, I promise to use the facility to its fullest, especially for Gs stationed abroad who have not seen home or family for a considerable time.

Fred Dodson, G3NVA
78. St. Bernards Rd., Olton,
Solihull, Warwickshire, England

Rectifier-Substitute Prices

Editor, *CQ*:

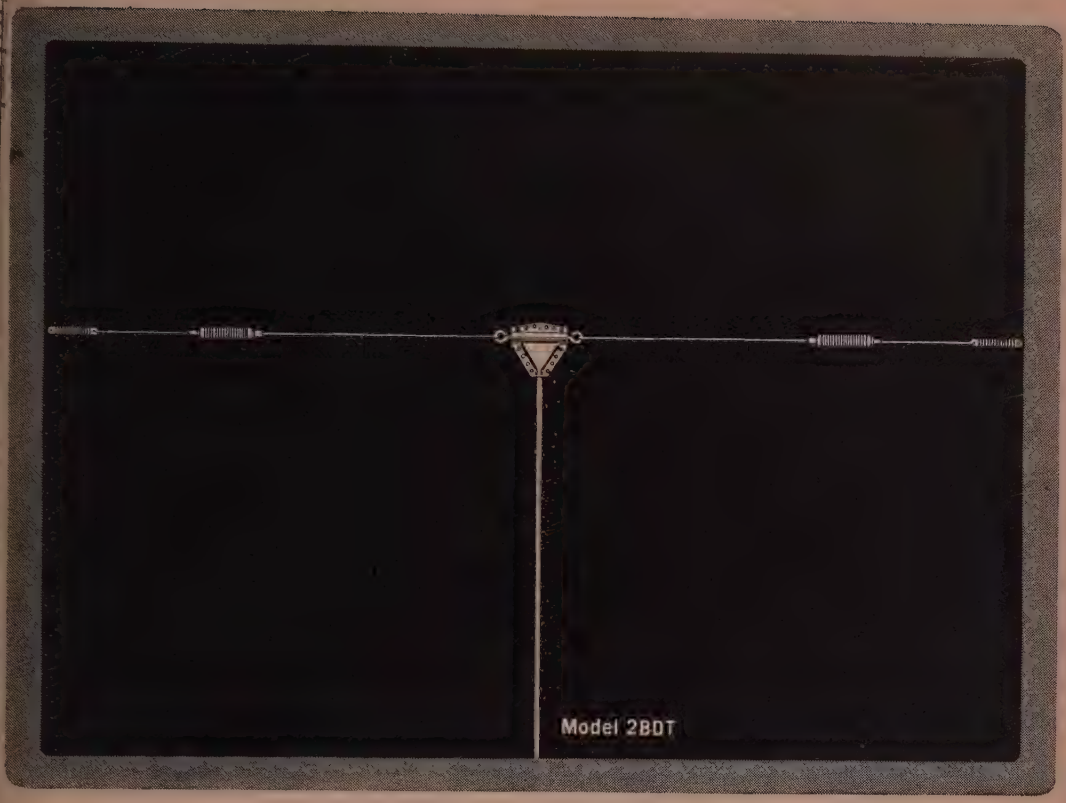
Our advertisement in *CQ* for Oct. (p. 105) and Nov. (p. 140) 1962 stated that an octal-base full-wave rectifier substitute is selling for $1.10. This is incorrect. The price should be $3.10. The unit replaces such tubes as the 5AU4, 5AW4, 5U4G, 5V3, 5V4G, 5Y3, 524 and others. It is rated at 1,800 p.i.v. at 700 ma.

We have been deluged for orders on this unit and would like to avoid further embarrassment.

Barry Gensler, W2LNI
Barry Electronics Corp.
512 Broadway, N. Y. 12, N. Y.

Our apologies for the error—*Ed.*

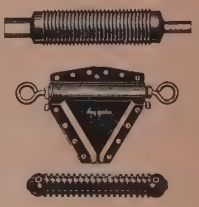
← For further information, check number 23, on page 126



It's NEW!

hy-gain TRAP DOUBLET for 80 and 40 Meters

Here's a ½ wave length Doublet with an overall length of 109 feet that will deliver optimum performance on 40 and 80 meters. Featuring a matched set of famous Hy-Gain "Slim Line" solid state traps that are virtually indestructible, the Model 2BDT provides automatic band switching and an SWR of less than 1.5:1 at resonance on both bands. It is designed to be fed with a single 52 ohm coax feed line. On 75 or 80 meters, the 2BDT will withstand maximum legal power and on 40 meters, it will withstand 500 watts CW or 1 kw PEP. The ruggedly constructed "Slim Line" traps, the slim profile injection molded end insulators and the unique Hy-Gain center insulator/coaxial adapter are impervious to all weather conditions—complete antenna will survive winds in excess of 100 MPH. The 2BDT is supplied complete with two end insulators, two matched 40 meter traps, center insulator/coaxial adapter and stranded copper-clad steel antenna wire. **HAM NET $19.95**



Hy-Gain's "Do It Yourself" Trap Kit for 80 and 40 Meter Doublet Model 2TD

Hy-Gain's Model 2TD kit consists of two matched "Slim Line" solid state traps resonant at 40 meters just like those used in the Model 2BDT described above. Also included in the kit is the necessary hardware for attaching the antenna wire to each end of the traps along with detailed instructions for building and tuning a doublet antenna for operation on 80 or 75 and 40 meters.
HAM NET $12.95

For further information, see your favorite Hy-Gain Distributor, or write...

HY-GAIN ANTENNA PRODUCTS 8405 N.E. Highway 6, Lincoln, Nebraska

For further information, check number 42, on page 126

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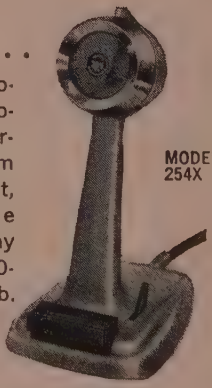
MODEL 350C

GOING . . .

Convenient, top-performing, low-priced Model 350C from Turner. Rugged, dependable mobile mike . . . world's most popular. Why pay more . . . only $16.80 list . . . buy the Turner 350C. Response: 80-7000 cps. Level: —54 db.



MODEL 254X

OR SITTING STILL . . .

A low-cost crystal microphone with on-off push-to-talk and lock switch. A perfect mike for the ham shack. Cable is 7 foot, three conductor (one shielded), wired for relay operation. Response: 80-7000 cps. Level: —48 db. List price $23.50.

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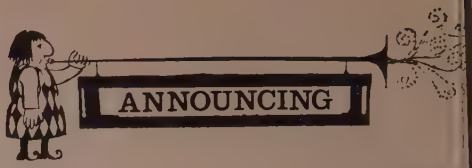
THE TURNER MICROPHONE COMPANY
925 17th Street N.E.,
Cedar Rapids, Iowa

IN CANADA:
Tri-Tel Associates, Ltd.,
81 Sheppard Avenue West,
Willowdale, Ontario

For further information, check number 41, on page 126



Maximum Power On 420

The FCC has seen fit to increase the 50 watt pow limit now imposed in the 420 mc band to one kilowat It should be noted that certain geographical areas st retain the old power. Text of the Commission's decisio follows.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington 25, D.C.

In the Matter of Amendment of Parts 2 and 12 of the Commission's Rules and Regulations to Remove the Power Restrictions in the Band 420-450 mc in the Amateur Radio Service	DOCKET NO. 14610 RM-304

REPORT AND ORDER

By the Commission:

1. The Commission adopted a Notice of Proposed Rule Making in the above-entitled matter on April 25, 1962, which was duly published in the Federal Register on May 3, 1962 (27FR4253), looking toward the amendment of Parts 2 and 12 in order to remove the power restrictions in the 420-450 mc band in the Amateur Radio Service, except in certain specified restricted geographical areas. Interested parties were invited to file comments on or before June 15, 1962, and reply comments on or before June 25, 1962.

2. Comments were received from several parties. All comments supported the Commission's proposed amendments; however, two suggestions were submitted which were given further consideration by the Commission and the interested Government agencies. Several comments proposed that the maximum authorized power in the Amateur Radio Service be permitted in the band 432.0-432.25 mc in the restricted geographical areas, thereby eliminating the need for any prior coordination with the Commission and the local Military Area Frequency Coordinator. The Government agencies concerned did not concur in this proposal.

[*Continued on page 112*]

When our Contest Committee Chairman, W1WY decides on a date for a World-Wide DX shindig, he gets some expert advice! Frank, on the right, is shown shaking hands with Newton Minnow, Chairman of the FCC. The smile is undoubtedly the result of good conditions that were present during the c.w. section of the "Test."

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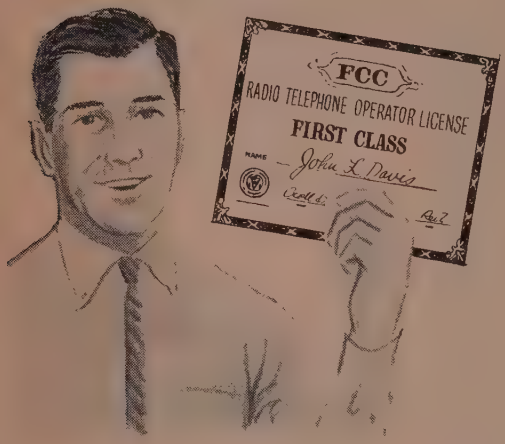

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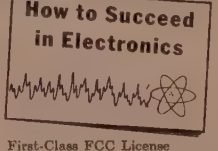

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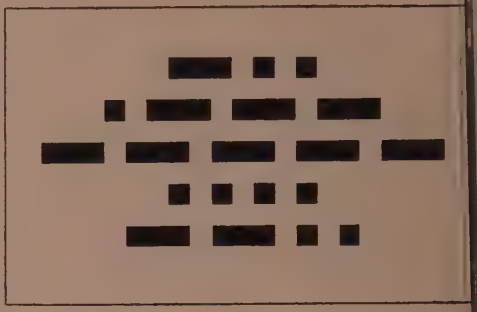
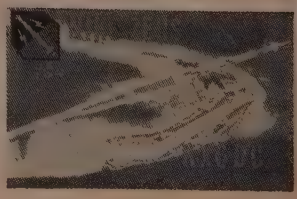
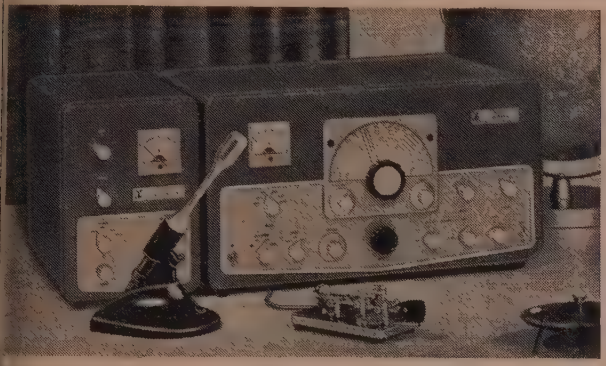


WELL, let's see . . . I think we have it right side up . . . yep, DJØHZ. This month's winner is none other than Al Brogdon K3KMO/DJØHZ who in his enclosed letter dared us to print it upside-down. Strangely enough, not one stateside QSL was received prior to the January deadline, hence, this fine array of DX Runners-Up from SM3BNV, DJ 5AA and KX6DC.

Runners Up



st Choice Among Nation's Amateurs!



Matched Pair

Outstanding performance on SSB, AM and CW with absolutely no compromise on any mode!

SSB ADAPTER"—The new filter-type SSB generator—ith bandswitching 80 through 10 meters . . . more than 0 db sideband suppression . . . more than 45 db carrier uppression! When used with the Viking "Valiant" or Valiant II" it places 275 watts P.E.P. at your command. wo compact units and interconnecting cables . . . RF nit is only 8" wide—may be placed on your operating esk. Power supply unit may be placed in any convenient cation. Features built-in multiplier requiring VFO input nly—band-pass interstage couplers require no tuning—esign and front panel make operating practically fool-roof. Superb audio fidelity and balanced audio response; xcellent sideband, spurious and carrier suppression.)ther features: positive VOX and anti-trip circuits with uilt-in anti-trip matching transformer and adjustable OX time delay. With remote power supply, tubes and rystal filter, less microphone.

Cat. No. 240-305-2—Wired, tested.....Net $369.50

NVADER—More exclusive features than any other Trans-nitter/Exciter on the market today! Specially developed igh frequency, symmetrical, multi-section band-pass rystal filter for more than 60 db sideband suppression—nore than 55 db carrier suppression! Instant bandswitch-ng 80 through 10 meters—no extra crystals to buy—no ealigning necessary. Delivers a solid 200 watts CW in-ut: 200 watts P.E.P. SSB input; 90 watts input on AM! 25-30 watts output—upper sideband and carrier). Built-n VFO—exclusive RF controlled audio AGC and ALC limiter type) provide greater average speech VOX and nti-trip circuits. Fully TVI suppressed. Self-contained eavy-duty power supply. With tubes and crystals.

Cat. No. 240-302-2 Wired, tested.....Net $619.50

NVADER 2000—Here are all of the fine features of the "Invader", plus the added power and flexibility of an ntegral linear amplifier and remote controlled power supply. Rated at a solid 2000 watts P.E.P. SSB, 1000 watts CW, and 800 watts AM! (250 to 300 watts output—upper sideband and carrier.) Wide range output circuit 40 to 600 ohms adjustable). Final amplifier provides exceptionally uniform "Q". Exclusive "push-pull" cooling system. Heavy-duty multi-section power supply. With power supply, tubes and crystals.

Cat. No. 240-304-2 Wired, tested.....Net $1229.00

HIGH POWER CONVERSION—Take the features and performance of your "Invader" . . . add the power and flexibility of this unique Viking "Hi-Power Conversion" system . . . and you're "on the air" with the "Invader 2000". Wired, tested, includes everything you need—no soldering necessary—complete conversion in one evening.

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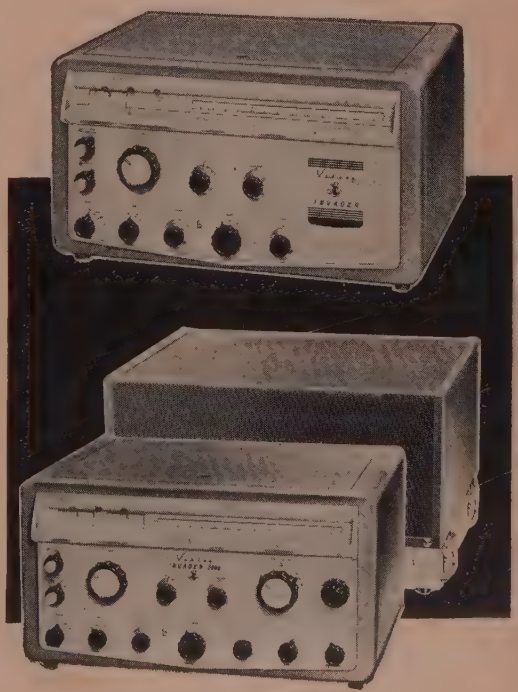
"VALIANT II"—Outstanding flexibility and performance—bandswitching 160 through 10 meters—delivers 275 watts input CW or SSB (with auxiliary SSB exciter or Viking SSB adapter) and 200 watts AM! Low level audio clipping—differentially temperature compensated VFO provides stability necessary for SSB operation! High efficiency pi-network tank circuit—final tank coil silver-plated. Other features: TVI suppression; time sequence (grid block) keying; high gain push-to-talk audio built-in low pass audio filter; self-contained power supply; and single control mode switching. As an exciter drives any popular kilowatt level tubes and provides quality speech driver system for high power modulators. Provision for plug-in SSB operation with no internal modification. With tubes, less crystals.

Cat. No. 240-105-1—Kit.....Net $375.00

Cat. No. 240-105-2—Wired, tested.....Net $495.00



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Random Thoughts — — — —

From the Boys in the Back Room

There are now almost 300,000 licensed radio amateurs in the United States. During 1963 these amateurs will spend in the neighborhood of $30 to 35 million dollars on commercial equipment including antennas, parts, and miscellaneous accessories.

Like many other popular hobbies such as photography, philately and automotive mechanics, our wonderful world of amateur radio has become a multi-million industry which provides a living for thousands of citizens in hundreds of cities.

Unlike the other hobbies, however, the great majority of commercial enterprises within the amateur radio field are owned and operated by active hams who are not only interested in running a profitable business, but in furthering the technical progress of the amateur fraternity as well.

For this reason, and because the very nature of the amateur is such that he invariably strives for perfection in the equipment he designs, many amateur products are expensively engineered and therefore sell at a relatively low markup.

Therefore, in attempting to market his product once it has been designed and put on the assembly line, the manufacturer of amateur radio equipment must carefully scrutinize many avenues of making his product known to the fraternity.

In so doing, he must allocate a certain percentage of his sales dollars to be reinvested in advertising. His advertising budget may normally include magazine space, literature, trade shows, amateur conventions, and various other miscellaneous costs involved with making his product better known.

We at *CQ* are rather proud of the manufacturers and dealers who advertise within our magazine. These businessmen have found through years of experience that advertising in *CQ* costs less than any other means of presenting their sales story. The reasons are basic. A single full page message in *CQ* can be aimed at 1,000 CQ readers for approximately $4.00. The same ad to 1,000 readers in QST costs about $5.00, and in 73 Magazines costs almost $15.00.

The conclusion that can be drawn is obvious. *CQ* is without a doubt the lowest-cost, finest advertising buy in the amateur radio market. Advertising in *CQ* doesn't cost . . . it pays!

ROTATABLE DIPOLE

FIRST and ONLY.. remotely tuned ROTATABLE DIPOLE!

DESIGNED SPECIALLY FOR 40 AND 75 METERS IN LIMITED ANTENNA SPACE

NEW-TRONICS CLIFF-DWELLER™

Housing for motors and gear trains with mounting yoke

Resonance and band switching control

ELECTRICAL FEATURES

- Antenna resonance finger tip controlled from transmitter location in shack.
- VSWR: 1.1 to 1 or less across entire band
- Feed-point variable to compensate for antenna environment
- No traps . . . no baluns . . . no matching devices of any kind
- Feed direct with any length 52 ohm cable
- Power handling capacity — maximum legal limit

The CLIFF-DWELLER is another New-Tronics first. Here's a tuneable dipole ideal for hams who live in apartments or in homes on small lots. The CLIFF DWELLER will give you unbelievable performance even in limited space.

MECHANICAL FEATURES

- Approx. lengths
  - 28′-6″ — 26′ 7.0-7.3 mc
  - 30′-6″ — 26′ 3.5-4.0 mc
  - 31′-4″ — 26′ Two-Bander
- Self supporting, accepts 1¼″ threaded pipe for mounting in standard rotators
- Maximum turning radius approx. 15′-8″
- Sturdy aluminum die cast housing for motors and gear trains which drive end sections of dipole
- Heat treated aircraft type, 1¼″ heavy wall aluminum tubing
- Completely waterproofed resonators and housings

MODEL NO.	FREQ. MC	WEIGHT	NET PRICE
CD 40	7.0-7.3	Under 20 lbs.	$ 92.50
CD 75	3.5-4.0	Under 20 lbs.	99.50
CD 40-75	Two Bander	Under 20 lbs.	129.50

See the CLIFF-DWELLER and other fine NEW-TRONICS products at your distributor or write us for descriptive literature.

NEW-TRONICS CORPORATION

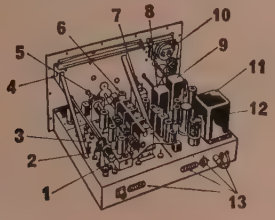
3455 VEGA AVENUE • CLEVELAND 13, OHIO

For further information, check number 81, on page 126

HEATHKIT "MOHAWK" DELUXE AMATEUR RECEIVER

1. Amateur band coverage only for maximum accuracy and stability. **2.** 1 uv sensitivity for 10 db S/N ratio—160 through 10 meters. **3.** Prebuilt, prealigned coil/bandswitch assembly. **4.** Rotating slide-rule dial. **5.** 15 tube double conversion superheterodyne receiver. **6.** Upper and lower sideband selection (crystal controlled). **7.** 5 selectivity positions (5 kc to 0.5 kc). **8.** Bridged T-notch filter. **9.** Stable, variable BFO. **10.** Panel "S" meter. **11.** Rugged well-rated components used throughout. **12.** Built-in 100 kc crystal calibrator. **13.** Terminals for antenna (50 or 300Ω), speaker (8 or 500Ω), accessories (B+, fil. muting), 117 V AC.

Kit RX-1..69 lbs...no money down, $28 mo.....**$299.95**



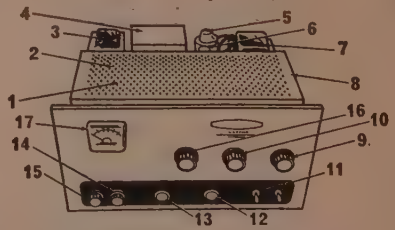
ACCESSORY SPEAKER KIT: Styled to match the "Mohawk". Heavy-duty 8" PM speaker. 8 ohms impedance. 4.7 oz. magnet. 7 lbs.

Kit AK-5.....**$10.95**

HEATHKIT "WARRIOR" DESK-TOP KILOWATT LINEAR AMPLIFIER...OPERATES SSB, AM & CW—80 THROUGH 10

1. Four 811A's **2.** Fan cooling **3.** 5-50 hy. swinging chok **4.** 8 ufd, 2 KV, oil-filled filter capacitor **5.** Two 866A's **6** Monitor scope output with level control **7.** 1500 v. Powe transformer **8.** Internal RF shielding **9.** Loading control **10** Band switch, 80 through 10 meters **11.** Power and Hig Voltage interlocked switches **12.** High Voltage pilot ligh **13.** Power pilot light **14.** Relative Power sensitivity contro **15.** Meter switch with Grid, Plate, Relative Power, and Hig Voltage positions **16.** Tuning control with band marking **17.** Meter

Kit HA-10..101 lbs...no money down, $22 mo....**$229.9**



COMMUNICATIONS MICROPHONE: Specially designed for SSB communications. Response limited from 300 to 3000 cps voice frequencies. Stand has grip-to-talk switch with lock position. Hi-Z output. 3 lbs.

HDP-21....no money down, $5 mo.....**$29.40**

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choose from the widest selection at the lowest prices . . . choose quality engineered Heathkits!

ATHKIT "MARAUDER" SSB TRANSMITTER.. MATCHED AT LESS THAN TWICE ITS PRICE!

perates SSB (upper or lower sideband), CW, AM and .. **2.** 180 watts P. E. P. on SSB and CW—80 through 1. Panel meter (grid, plate, HV, ALC, Rel. Pwr). **4.** VOX trolled break-in CW operation. **5.** Automatic level trol for higher talk power. **6.** Multi-section, hermetically ed crystal band-pass filter. **7.** Dual conversion, crystal trolled heterodyne oscillator. **8.** FSK input. **9.** Acces- sockets. **10.** Monitor scope output. **11.** Air-cooled, lded final amplifier. **12.** Heavy-duty power supply. **13.** to 1 gear drive tuning assembly. **14.** Preheated, tem- ature compensated VFO—100 cps stability. **15.** Carrier pression, 50 db; unwanted sideband suppression, 55 db.

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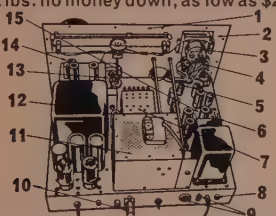

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The "Super-Pi" Transmitter

AUSTIN C. FARRELL*, W2BXE

This all band, pi-coupled transmitter employs Taylor supermodulation. Power input to the final is 50 watts unmodulated and 100 to 150 watts on modulation peaks. The low powered modulator is self contained and the power supply, made from surplus TV components, is an outboard unit.

THE Super-Pi transmitter uses a modern version of the supermodulation circuit originally developed by R. E. Taylor in 1948.[1] Those of you who recall earlier construction articles on supermodulation will remember transmitters operating on a single band, tuning was critical, and a tapped inductance coil was used in the final tank circuit. The unit to be described operates 80 thru 10 meters, can be used with v.f.o. and uses standard tank circuits. Power input to the final is 50 watts with no modulation, an average of 100 watts with modulation with peaks to 150 watts or more.

Advantages of this circuit as compared to the original supermodulation transmitters and conventional units are outlined below.

1. Operates 80 through 10 meters. Earlier circuits covered only one band.
2. Only low power audio tubes are used for modulation.
3. No modulation transformer is required. A routine class-B driver transformer is used which is small and convenient.
4. Standard tank circuits are used with no tapped coils.
5. The final r.f. amplifier tube may be operated at its full c.w. power rating.
6. Controlled carrier reduces receiver heterodyne interference.
7. Pi-coupling reduces harmonics.
8. A v.f.o. can be used, as tuning is not c[ri]tical.
9. During modulation, the sidebands a[re] emphasized, giving it a characteristic sig[nal] which drives through the QRM.

10 On c.w., only low power audio tubes a[re] standing idle.

*27 Heath Road, Fishkill, New York.

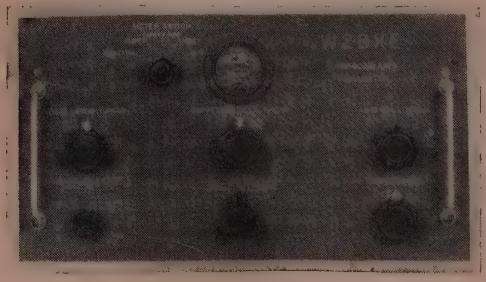
[1]Taylor, R. E., "The Taylor Super-modulation Principle," Part I, Part II, *Radio News*, Sept. 1948, page 42, Oct. 1948, page 44.

The Circuit

The Super-Pi transmitter receives its nam[e] from the use of supermodulation combined wi[th] pi-coupling between stages. Pi-networks are e[x]cellent low-pass filters and are very effective i[n] preventing harmonics of the desired frequenc[y] from being passed on to the next stage.

The r.f. circuit (shown in fig. 1) uses a co[n]ventional 6AG7 crystal oscillator and a 6L[6] buffer multiplier. The coil in the oscillator pla[te] is a Barker-Williamson Band-Hopper. It require[s] a dual 100 mmf capacitor for tuning, C_1. Input capacity of the 6L6 buffer, plus wirin[g] capacity and the output capacity of the oscillato[r] plate circuit, reduces the capacity available fo[r] tuning. Using pi-coupling, this capacity is di[-] vided across each half of the split-stator tunin[g] capacitor; thus there is more capacity availabl[e] for tuning. This was found to be a valuabl[e] feature in the plate circuit of the 6L6 buffer[,] where input capacity to the final is high.

The three tube final is the heart of the circuit[.] It consists of a single 807 as the carrier tube[,] and two 807s in push-pull as peak tubes. The[y] carrier tube is biased for normal class *C* opera[-] tion and provides the carrier during no modu[-]



Front view of the Super-Pi transmitter employing Taylor supermodulation. The bottom row of controls, from l. to r. are, BAND SELECTOR, TUNE-OPERATE, FINAL TUNING. The next row is OSCILLATOR TUNING, BUFFER TUNING and ANTENNA LOADING. The METER switch is to the left of the meter.

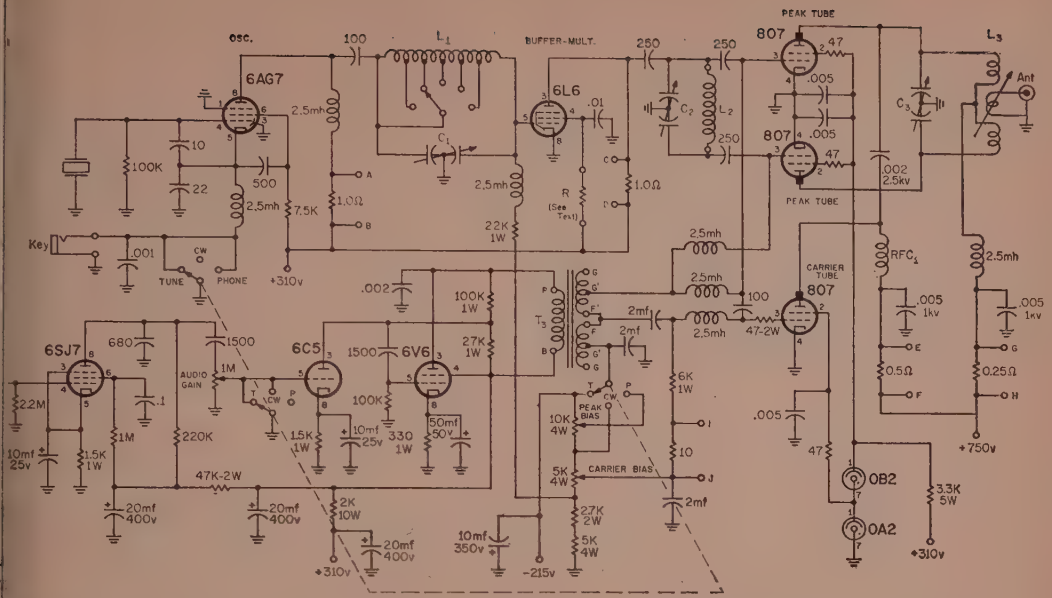


Fig. 1—Complete diagram of the 150 watt, all-band transmitter employing Taylor Modulation. Capacitors values greater than 1 are in mmf; less than 1 in mf unless otherwise noted. Resistors are ½ watt unless otherwise specified. The 6L6 screen resistor, *R* is mounted in the plug-in coil form of L_1. See text.

C_1—100 mmf per section split stator variable. Hammarlund MC-100-M.

C_2—50 mmf per section split stator variable. Hammarlund MC-50-M.

C_3—100 mmf per section split stator variable. Johnson 154-505.

L_1—Coil and switch, B&W "Bandhopper" multi-band coil assembly.

L_2—Plug-in coils for each band wound on 1" dia. 5 prong coil form, Millen #45005. Resistor *R* mounted within coil form. See Text.

80m—52½ t. #26 e. closewound, *R* = 56K 1 watt. Shunt L_2 with 100K 1 Watt.

40m—23½ t. #26 e. closewound, *R* = 47K 1 watt.

20m—11½ t. #16 e ⅞" long. *R* = 30K 1 watt.

15m—6½ t. #16 e. ¾" long. *R* = 10K 1 watt.

10m—4½ t. #16 e. ⅝" long. *R* = 6K 1 watt.

L_3—Swinging-link type plug-in tank coils. B&W BVL series for bands desired. See Text.

RFC_1—National R-175A Transmitting type choke.

T_3—Class-B driver transformer. UTC S-8.

lation conditions. For amplitude modulation, the peak tubes are biased to zero plate current with normal r.f. drive applied. The audio from the secondary of the driver transformer overcomes the bias on the positive half-cycles of modulation, allowing the peak tubes to conduct and amplify the r.f. signal. The drive to the carrier tube is reduced during modulation when r.f. drive is absorbed by the peak tubes. The output of the peak tubes is sideband power which gives the supermodulated signal its characteristic punch. This transfer of drive from the carrier tube to the peak tubes and the application of a small amount of audio signal to the grid of the carrier tube allows the r.f. envelope to reduce to zero for 100 percent modulation and still retain rounded corners at the zero line thus preventing distoration. For c.w. operation, the bias on the peak tubes is reduced by the TUNE-C.W.-PHONE switch to provide a high level of carrier for this type of operation.

The modulator consists of a 6SJ7 speech amplifier, a 6C5 driver, and a 6V6 output tube. The resistors across the primary of T_3 provide stabilization for the variation in loading on the 6V6. Transformer T_3 should be a special transformer for supermodulation which unfortunately is no longer available, however a UTC model S-8 class-*B* driver transformer may be used in its place. The tap on the secondary of T_3 is not in the center but a little off center towards the top grid connection. The secondary winding must have a low d.c. resistance due to the peak tubes drawing a high peak grid current.

The power supply (shown in fig. 2) uses a salvaged TV power transformer, T_1. It should be capable of supplying at least 400 ma. A bridge circuit using a 5R4GY tube for two of the legs and silicon diodes for the other two legs, provides two output voltages, plus 750 and plus 310 volts. A filament transformer, T_2, connected backwards into a voltage doubler circuit provides minus 215 volts of bias. Separate supplies may be used if available.

Construction

The transmitter is constructed on a standard 10"x17"x3" chassis. Looking at the panel, low power r.f. and a.f. stages are to the left and high power stages are to the right. The r.f. tubes are in the middle of the chassis and a.f. tubes are along the rear edge. A relay in the transmitter switches the antenna from the receiver to the transmitter when the high voltage switch in the

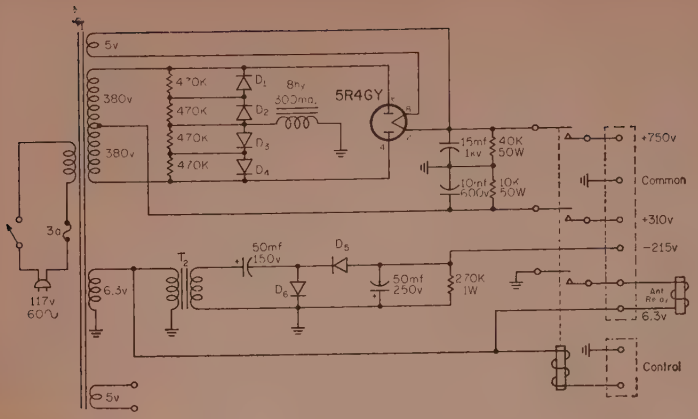


Fig. 2 — Power supply f... Super-Pi Taylor modulated-... mitter makes use of salvag... components.
T_1—380-0-380 V at 400 ma.
T_2—6.3 V at 1 ampere con... backwards.
D_1, D_2, D_3, D_4—500 ma, 400...
D_5, D_6—100 ma, 200 p.i.v.

power supply is turned on.

The audio circuits are constructed on home-brew turret sockets which hold all components except the cathode bypass capacitors and the driver transformer T_3.

Most of the wiring employs shielded cable. Exceptions are the 807 heaters, wires from the driver transformer, and r.f. circuits that cannot stand the capacity to ground. Electrical ground was made at the power socket. The r.f. ground for the 807 tubes was made at a metal post screwed to the chassis near the 807 sockets. Shielding on wires were grounded at any convenient point.

The tank circuit for the plate of the 6AG7 oscillator has the tuning capacitor mounted above the chasis. The Band-Hopper coil is directly below it under the chassis. The tank circuit for the plate of the 6L6 buffer-multiplier also has its tuning capacitor above the chassis. The buffer-multiplier is a plug-in type in a five prong socket placed to the rear of its tuning capacitor. In both circuits r.f. wires must run through the chassis. The tuning capacitors are insulated from the chassis by washers. They are grounded to the chassis by a wire and lug under the heads of the capacitor mounting bolts... the other side of the chassis, lugs are also ... under the nuts to connect to the coils. ... construction causes the r.f. to pass through ... mounting bolts, not using the chassis for ... r.f. circulating tank current. Loss on 10 me... was reduced to the point where the drive ... the 807s was doubled.

The coils were wound on 5 prong, one i... diameter coil forms (Millen #45005), howe... 4 prong units may be used. Resister R_1, in ... screen of the 6L6 buffer-multiplier, is a 1 wa... mounted in the form and connected between ... 1 and 5. The value of R_1 determines the d... to the final and varies for each band as follo...
80-56K 40-47K 20-30K 15-10K 10-...

The 80 meter coil *only* is paralleled by ... 100K 1 watt resistor also housed in the fo... The half turn specification listed in the c... permit the last turn to terminate over the ... to which it connects.

Rear view of the "Super-Pi" transmitter showing parts layout. The small transformer near the edge of the chassis was replaced by a UTC-S-8. Behind the transformer is the 6L6 Buffer-Multiplier, plug-in inductor L_2 and C_2. The crystal is hidden behind the two speech amplifier tubes. Key and mike jacks are at the right.

Adjustments and Operating

The following procedures are required wh... tuning the transmitter for the first time ... when changing the band of operation. Use ... dummy load for initial operation. Many of t... steps can be eliminated as you become famili... with the equipment. The steps should be pe... formed rapidly or with the high voltage turne... off between switch operations. Tubes are ove... loaded until adjustments are completed.

1. Insert the proper crystal, buffer-multipli... plate coil, final tank coil and plug-in link. Us... a 75-80 meter crystal for 75-80 meters, an 8... or 40 meter crystal for 40 meters, and a 4... meter crystal for 20, 15 or 10 meters.

2. Turn the BAND SELECTOR switch in pla... circuit of oscillator to the proper band. Thi... switch determines the output frequency of th... oscillator tube and not the output frequenc... of the transmitter. For example, for 10 mete... operation using a 40 meter crystal, set thi... switch to 20 meters. This provides 20 mete... drive to the 6L6 buffer-multiplier. A 10 mete... coil in the plate of the 6L6 causes this tube to ... double to provide 10 meter drive to the final.

3. Set the TUNE-C.W.-PHONE switch to the TUNE position.

4. Set the meter switch to the OSCILLATOR position.

5. Turn on the HIGH VOLTAGE switch on the power supply.

6. Tune the oscillator plate for a dip in plate current.

7. Set the meter switch to the BUFFER position.

8. Tune the buffer-multiplier plate for a dip in plate current.

9. Turn the meter switch to the CARRIER GRID position. Grid current should not be over 2 ma. Detune buffer plate if necessary. (The value of "R" and the 100K resistor in the 75 meter coil were selected to provide the correct drive.)

10. Turn the meter switch to the CARRIER position.

11. Tune the final plate for a dip in plate current.

12. Adjust the CARRIER BIAS control (on rear of chassis) until the meter reads half scale. Repeat steps 9 and 12 again. (This is not necessary if the control is already set for the band in use.)

13. Turn the meter switch to the PEAK position.

14. Turn the TUNE-C.W.-PHONE switch to the PHONE position.

15. Adjust the PEAK BIAS control (on rear of chassis) until meter reads zero or barely above when not talking into the microphone. (This step is not necessary if the control is already set for the band in use.)

16. Turn the meter switch to the CARRIER position to see that the meter reads half scale. Readjust the CARRIER BIAS control if necessary. (This step is not necessary if the control is already set for the band in use.)

Adjustments up to this point have been with a dummy load. If a light bulb (50-60 watt) has been used as a dummy, modulation can be checked by talking into the microphone. The bulb should brighten intensely with modulation. If not, increase the load on the final amplifier by swinging the link closer to the final tank coil. Redipping of the carrier plate current may be required.

17. Disconnect the dummy load and connect the antenna (h.v. off).

18. Redip the carrier plate current and check for upward modulation. If there is no upward modulation, increase the link coupling as with the dummy load or increase the loading with

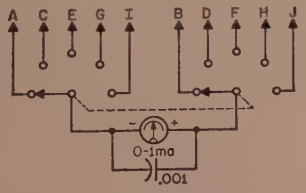
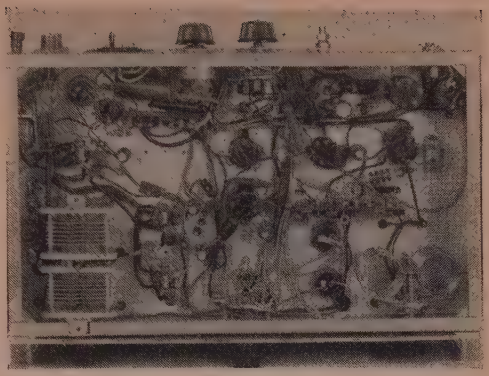


Fig. 3—Wiring of the meter switch. Meter shunts were calculated on the basis of a 70 ohm movement for the ranges indicated.



Bottom view of the transmitter showing parts placement. The two bias pots are mounted on the rear apron next to the audio gain control. The antenna relay is mounted at the upper left and the "vector" sockets used in the audio section are at the right.

adjustments of the antenna loading circuit you are using.

General Notes

The following general observations and suggestions may help to get the unit operational in a minimum of time.

Antenna coupling is tighter than for other types of circuits. I use between 3 and 10 turns in the link (plug-in type), depending on the band in use and the antenna coupler.

If an oscilloscope is available, check for distortion in audio drive to the grid of the peak tubes using an audio oscillator as a source signal. There should be a slight rounding of the positive peaks due to grid current of the peak tubes, with no distortion on the negative peaks. No rounding of the positive peaks indicates lack of audio drive or excessive bias. Severe rounding or square tops indicate excessive audio with resulting poor quality at the receiver.

R.f. feedback may be encountered in T_3. Be sure that T_3 has a low d.c. resistance in the secondary winding. Shield the leads with copper braid. If feedback still persists, try a 250 mmf capacitor from the top of the secondary of T_3 to ground (junction of T_3 and the two r.f. chokes to the grids of the peak tubes).

The potentiometers used in the bias voltage divider were used as they were available. It would be better to have a larger resistance pot in place of the 5K pot to provide a wider range of control. Other values of potentiometers and fixed resistors may be used to give the same, or slightly larger, voltage adjustment range. Less total resistance is not recommended as it will load down the bias supply and reduce total voltage available.

The voltage tap selected for the 6L6 grid return may vary, without affecting operation greatly, as its operation also depends upon grid-leak bias. The tap should be higher than minus 70 volts to insure cut-off of the 6L6 when it has no r.f. drive. ■

St. Pierre OR BUST!

BY HAL SMITH*, W2GKE/FP8BM

St. Pierre is the closest bit of geography to which a U. S. amateur can venture and still call himself "rare." It's off the coast of Nova Scotia and still retains quaint French Customs. W2GKE relates fully his experiences there and offers many helpful hints for others who may want to duplicate his efforts.

Part One of Two Parts

No doubt, many an avid DX man has often wondered just what it would be like to operate a DX station with a rare call. I was also afflicted with this malady for some time. When the idea of a DXpedition to the St. Pierre Miquellon Islands was first proposed by Dave, K2LSU and Ed, K2OQA, I received the idea with weak enthusiasm. However, when the idea was proposed to the XYL, she was in a more enthusiastic mood about such a venture than I was. Her reason for approval of such a trip was based on the fact that she thought that every amateur should go on at least one such venture during his tenure as a ham. Therefore, there can be no doubt as to the writer's decision in this matter. It was immediately decided that "W2GKE just had to go on this trip to the magic land of St. Pierre."

Since many amateurs do not know where the St. Pierre-Miquellon (pronounced mick-a-lon), Islands are located, it might be well to briefly describe the location and touch on the history a bit. These islands are located 160 miles northeast of Sydney, Nova Scotia or 17 miles off the south central coast of Newfoundland. There are three islands in the group. St. Pierre Island has a population of about 4000 and the other two islands Miquellon and Langlade have a total population of about 1200. These two islands are somewhat isolated from St. Pierre and maintain communication with St. Pierre by radio. St. Pierre has an area of about 30 square miles and all three islands total 90 square miles. The temperature never goes above 70°F or below 0°F. The island is quite barren and there are no trees except for some pine scrub-bushes at the southwestern tip near the town of Savoyard.

During the prohibition era the islands were engaged in rum running and their economy was highly developed. However, with the demise of prohibition the islands returned to fishing, and this is now their main industry. There are many old warehouses on the island which were used for liquor storage during prohibition days and are now just crumbling in decay.

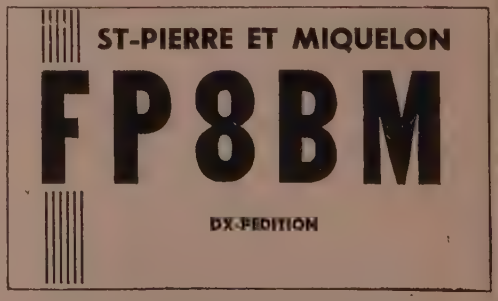
Preliminaries

Since it was apparent at this time that Dave, Ed and myself were to be the members of this DXpedition, we started planning the trip and held meetings three times a week to discuss all details. We had made up our minds at the outset that everything had to progress smoothly without red tape.

We wrote to Gus Roblot, FP8AP (who is the only amateur on the island) for some information and his letter contained many helpful hints on such a trip. We wrote to K4RSD/-FP8BF and in addition, went to visit Charlie W2EQS/FP8AS who is a personal friend of mine. We spent quite a few hours with Charlie and he supplied considerable information on forming a DXpedition to FP8 land. In addition, we sampled some of the fine liquors which he had brought back from St. Pierre[1].

Based on the information received from the above sources, we went to work on the plan-

[1]Charlie is a wine taster by profession.—*Ed*



The QSL card used by the St. Pierre DXpedition.

*26 Linden Street, Bayonne, New Jersey.

ning of our trip. Don't write Gus unless you're *positive* you will get to the island and don't write for a license, as they are only issued upon arrival.

We applied for a U.S. passport, which was received in a week. A passport is very handy to have even though we found that if one did not have a passport, they would be permitted to stay on St. Pierre after paying a fine to the local authorities of about five to seven dollars. However, it is my firm belief that one should never leave without a passport because it might come to pass that the next amateur would not be permitted to enter without one. So play it safe and get a passport.

We were advised by the U.S. passport office to obtain a smallpox shot and obtain the International Certificate of Verification, confirming the receipt of the vaccination. We found that no one asked us for this certificate and based on this, one might eliminate this requirement unless he had reason to believe that such a shot might be beneficial.

The next requirement is to write the Department of Transport in Ottowa, Ontario and obtain a "Certificate of Registration of Radio Station Licensee of United States of America and Authority for Operation in Canada." This certificate also permits one to operate mobile in Canada. You must have this certificate to be able to transport your equipment through Canada without any red tape. There is no charge for this certificate. You *must* bring along your FCC license (which must be a General class license or higher) to operate an amateur station on St. Pierre.

While you're in the process of applying for a passport, the question might arise as to whether or not a visa is necessary. I investigated this angle and found that the French government insists that you post a bond for $150 per person before they grant a visa. Therefore, I would like to issue a warning to all amateurs contemplating a trip to these islands; do not, under any circumstances, visit the French Consul's Office for any reason whatsoever. Fortunately, I did not pursue the visa situation any further after communicating with the French consulate.

There have been two instances in the past several years where an amateur pursued the French consulate for a ruling on a visa and this all but created an international incident. The reason for this, is that our government does not have a reciprocal amateur radio operating agreement with any country other than Canada. Therefore, when the above mentioned incidents occurred, the French government promptly notified the St. Pierre government not to allow the U.S. amateurs to operate on St. Pierre, because we did not permit French amateurs to operate in the U.S.

Preparations

Now to get on with the actual preparations for our DXpedition. We had decided to take a Johnson Viking II transmitter as we were all familiar with this rig. We also took a Johnson v.f.o. and a dozen odd crystals to allow us to operate in choice parts of the 10 to 80 meter bands, should our v.f.o. fail. The receiver was an SX-100 with a DB-23 preselecter. In addition, we took along a small Elmac mobile, all-band receiver in case our main receiver failed. Since we had planned to operate on 10 through 80 meters, you can be sure that the antenna situation was given some thought.

For operation on 10, 15 and 20 a Mosley Tri-band Trapmaster mobile antenna, equipped with four sixteen foot radials, was used as a ground plane for operation on these bands. After all, hadn't Ed, K2OQA, worked some 80 odd countries with this antenna at his home QTH? So why shouldn't this antenna perform using a magic FP8 call?

We also took along an 80 meter coax fed doublet and a 40 meter ground plane antenna, made from surplus three foot MS series screw-in whip sections. We had packed a total of 350 feet of coaxial cable to cover any situation that could arise. All sorts of spare parts, tools, tubes and accessories too numerous to mention, were also packed.

We gathered all the equipment together in my cellar and set up the work bench as an imaginary operating position and assumed that the only thing available on the bench was an a.c. outlet. This paid dividends, because we did not forget a single piece of equipment as we later found out. One piece of equipment that we packed was an electric alarm clock found to be of no value. You cannot use a 115 volt 60 cycle electric clock on St. Pierre as they only have 50 cycle current and electric clocks will not keep correct time. So bring along a good old fashioned hand wound alarm clock or wrist-watch.

As was previously stated, we were thorough in our preparation and the many weekends we spent did not go unrewarded. We even made

A view of the S.S. *Langlade*, a converted minesweeper, docked at St. Pierre. It accomodates 10 passengers but has no definite sailing schedule.

out a DX predicition chart but did not get a chance to use it as we were much too busy operating. The equipment was packed in four plywood cases and waterproofed with plastic sheeting. The two vertical antenna whip sections were packed in a plastic bag. The total weight of our equipment was 300 pounds.

We prepared ten mimeographed copies of every single piece of apparatus that we carried on the trip, described down to the last nail and bolt. We found that this equipment list later insured our rapid passage thru customs and it would be wise to prepare such a list of all equipment you are taking on the trip.

After many months of preparation, "D Day," or shall we say "FP8 Day," finally arrived. We securely packed our equipment cases and luggage into the faithful "Impala" and prepared for North Sydney, Nova Scotia.

Under Way

So on Friday, July 29th at 7:30 P.M. with $300 each in our pockets we were finally on our way to St. Pierre Island. It had previously been decided to drive straight through to North Sydney without any stopover periods. We encountered foggy, rainy weather and some bad roads in Maine. In addition, there were several long stretches of roads under construction. Many times we were unable to travel faster than 20 miles per hour, due to heavy fog.

After driving almost 18 hours, we finally reached Calais, Maine, which is close to the Canadian border. We stopped at a U.S. Customs gate here and displayed our passports, Canadian radio permit and offered the Customs agent a copy of our equipment list. He accepted this list and asked us to declare the total value of the equipment. He then issued us a permit to allow us to proceed with our equipment to the Canadian border. We were out of U.S. Customs in about five minutes and this was probably due to our having all the necessary papers in order.

We then proceeded 200 feet down the road to St. Stephen, New Brunswick which is the Canadian Customs checkpoint. We displayed the above mentioned papers, in addition to the permit given us by the U.S. Customs, to the female customs agent on duty. She then called over another customs agent, whose nickname was "Spider," to issue our permit to pass through customs. Since our papers were in order he asked us if we had time and when we answered in the affirmative, he proceeded to entertain us for ten minutes, by doing coin tricks. He was very talented and held us spellbound while he displayed an amazing dexterity in coin manipulation. We were out of the Canadian Customs in fifteen minutes including the entertainment period.

We now proceeded on the last 530 mile leg of our 1200 mile trip to North Sydney. Once again, the weather was very foggy and the roads throughout most of this leg of the trip were quite narrow and one had to be quite familiar with them, in order to negotiate the many curves and road dips. In addition, we encountered a few road blocks and the detour signs were not clear as to alternate routes. It seemed as though they decided to dig up half the roads in the Maritime provinces during our trip to North Sydney. All these things, coupled with the bad weather, accounted for the fact that it took us almost 37 hours to reach North Sydney.

Last Leg

We finally reached North Sydney at noon on Sunday in a very tired condition. We had thought of taking a scenic tour through Newfoundland on our way to St. Pierre but in view of our condition and the bad roads and foggy weather we had encountered we decided to take the most direct route to St. Pierre.

Therefore, we immediately headed for the dock area to book passage on the S.S. *Miquellon* or the S.S. *Langlade*. But lo and behold, we were confronted with the miserable fact that we had spent the last 37 hours racing against time to catch an imaginary boat that was not in dock. Our spirits were at a new low at this point, but we had to fight our way out of this predicament. These boats sail only when there is sufficient cargo and passengers are secondary. This is due to the fact that St. Pierre is supplied with all the necessities of life by cargo transported by these two boats. Therefore, there are no scheduled sailing times available, nor can reservations be made.

Well, now that we came this far, we were not in the mood to turn back. We stopped off at a little grocery store, owned by George Hackett, and explained our plight to him. He called Mr. Johnson who is the agent for Pickford and Black who run these two boats. He advised us that the *Miquellon* had left the previous Wednesday and would not return for another ten days. The *Langlade* was not available as it had sailed on a chartered trip and would not return for about a week.

This was a sad state of affairs when we only had a two week vacation for the entire trip. However, all was not lost as George inquired whether or not we were interested in going to St. Pierre by plane. Boy, you should have seen our faces light up! He said a 26 passenger DC3 made trips to the island during the summer season. He then called Sam Goora, who together with Camille Goora, are the agents for the Maritime Central Airways, and they told us to come over to the office. We were booked on the plane for a 9:00 A.M. Monday flight to St. Pierre which takes a little over an hour. The cost is $30 per passenger one way and this included 40 pounds of baggage. They charge ten cents per pound for your equipment and since we had 300 pounds of radio gear it meant that it would cost us $30 each way to transport it. So, dividing this

among the three of us it came to $40 per person for a one way trip. This is not too bad if you consider the expenses via boat and the fact that the plane leaves every day as long as weather permits during the period July 1 thru September 5.

We went to lunch and then came back to Sam Goora's office to rag chew. Both Sam and Camille, who doubles as the French Consul in Sydney, are tall heavy set boys and were extremely friendly. We got quite a charge out of Camille trying to raise St. Pierre radio, as he kept yelling "St. Pierre from Sydney" in a very high pitched voice.

We had been informed by Gus Roblot, FP8AP, to go to the Western Union building as soon as we got to North Sydney and they would get in touch with him in St. Pierre via the overseas teletype. The operator in charge, Bill, whose call letters I've forgotten, conducted us on a tour of the building. He permitted me to send a teletype message direct to St. Pierre and the operator on duty relayed the message to Gus that we would be on the morning plane and for him to notify all concerned of our impending arrival.

Now that we finally had succeeded in arranging transportation for the final leg of our trip we checked in at the Belmont hotel for our first nights sleep in the last 50 hours. We got up early Monday morning and drove our equipment to the airport. Sam said he would arrange to store our car until we came back to North Sydney. However, there was fog on St. Pierre and our takeoff was delayed until noon. The fog settles in very rapidly on the island and all flights are made in the daytime under visual flight rules, as instrument landings cannot be made due to the lack of such facilities on the island.

We boarded the DC3, and an hour later were preparing to touch down on the island. We were actually seeing the culmination of several months of planning through the porthole windows of the airplane. Ed and Dave both enjoyed the plane trip, which happend to be their first. When we left Bayonne, we never dreamed that we would be taking a plane on the last leg of our DXpedition to St. Pierre Island, but were indeed very happy that such facilites existed. Considering the time saved, it is well worth the extra fare as compared with boat travel.

Arrival

We touched down on the island at 1 P.M. and as soon as the plane doors were opened, we were swamped by taxi drivers offering to transport our gear to the Robert Hotel. The taxis on the island are all small private cars and we selected the two largest cabs as we could not find one cab large enough for all our gear. One can also obtain ham accommodations at other tourist homes, including Mrs. Henri Lefevre's home. She asked us to stay at her place and said she'd permit antennas to be put up and would be glad to welcome all amateurs.

The Robert Hotel in St. Pierre, QTH of FP8BM. W2GKE is guarding the gear on arrival. The Robert Hotel is where most DXpeditions are lodged on St. Pierre.

We proceeded to pass through a very small customs gate, where the officials asked to see our passports and were hoping we did not have one. There were several people who did not have a passport and were fined about seven dollars and permitted to proceed on their way. We piled our gear into two cabs and headed for the Robert Hotel which was located on the other side of the island. We were met by Francois Robert, a very congenial man in his late sixties, who runs the hotel. Reservations had been made a month before we left and in addition he knew of our arrival as Gus Roblot had relayed our teletype message which was sent prior to departure from North Sydney. Since it was lunch time, Monsieur Robert insisted that we have lunch before he took us to our quarters. The hotel rates are $7.50 per day which includes three delicious meals with wine. A bar is located in the hotel.

Incidentally, after lunch we each had a bottle of beer which was served by Madame Robert who spoke no English. She charged us $2.10 for three bottles which seemed quite high. Later on in the evening, we checked with Monsieur Robert who said that his wife should have charged 210 francs which would be equivalent to $0.84. This embarrased Madame Robert no end and for the rest of our stay at the hotel, she tried to offer her apologies even though she was handicapped due to the language barrier.

It might be well to mention at this point that you do not have to exchange your money, as U.S. funds are accepted on the island with the rate being 250 francs per U.S. dollar.

[*Continued next month*]

A Six Meter Double Conversion Converter

BY EDWARD LEVY*, CO2LE

Here is a double conversion converter whose output i.f. is in the broadcast band and is suitable for mobile or fixed use.

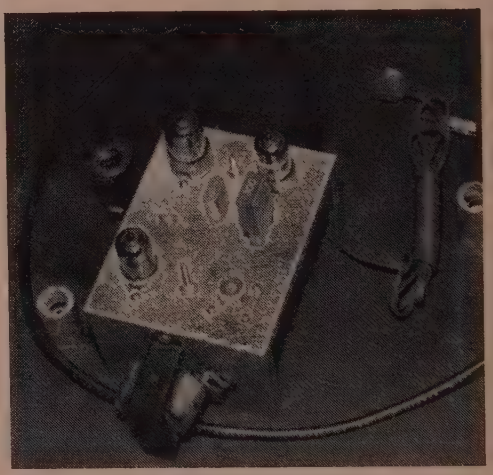
MANY of the hams who work v.h.f. frequencies (50 mc and up) use a converter ahead of their communications receiver in order to receive these signals. In this set up, the communications receiver acts as a tunable i.f. and audio system while the converter provides the front end. Thus, the versatility of this receiving system is directly proportional to the quality of the communications receiver used.

Not all amateurs are able to purchase high priced communication receivers of the double and triple conversion type, so they have to use cheaper receivers of the single conversion type. Low priced receivers generally cover the ham bands over a very small portion of the dial which tunes a wide spectrum of frequencies, and as frequency increases these portions become smaller and smaller. Thus, due to the single-conversion i.f. and the poor bandspread at high frequencies, the selectivity of the receiver drops down considerably. Yet even the cheapest communications receivers have adequate bandspread and selectivity in the broadcast band and neighboring frequencies, and image rejection is also adequate at these frequencies.

This converter takes advantage of this characteristic of the low priced receivers by yielding an i.f. output from 600 to 4600 kc. By using this range of i.f. frequencies, even the cheapest communications receivers make excellent i.f. and audio systems for the v.h.f. receiving system. Since most receivers cover the broadcast band with a full swing of the general coverage dial and their bandspread circuit is also connected at these frequencies, we can obtain superb selectivity and image rejection on the first megacycle of the six meter band, which is the most widely used portion.

The selectivity of the system on the other three megacycles depends entirely on the selectivity of the communications receiver at frequencies slightly above the broadcast band. The use of such an i.f. output in the converter makes the unit ideal for mobile applications also, although when a car receiver is used as an i.f. system the coverage is limited to one megacycle at a time due to the fact that the car receiver covers the broadcast band only.

*10 Huron Avenue, Jersey City, N. J.



Top view of the double conversion converter for 6 meters. The 6CB6 r.f. amplifier is located in the lower left alongside L_1. The 6U8 converter is in the upper left corner with the 3rd overtone crystal below L_3. The second converter crystal is to the right, below the 6J6.

Construction

The unit is built on a compact 3×4×5 inch aluminum minibox. Layout of parts is not critical, but it is essential to keep all connections as short and direct as possible in order to keep stray capacities and inductances from detuning the tank circuits.

Circuit Description

A 6CB6 is used as an r.f. amplifier whose broadbanded tank circuits tune from 50 to 54 mc. The amplified six meter signal is then fed to the grid of the pentode section of a 6U8 where it is heterodyned to 7 mc by the 43 mc signal produced by the triode section of this tube. Then it is capacitively coupled to a 6J6 where it is converted into broadcast frequencies by mixing it with a 6400 kc signal produced by the other section of the 6J6. To avoid drift and tuning problems, the oscillators are crystal controlled.

The tube filaments are shown in the schematic diagram wired for use with a 12 volt

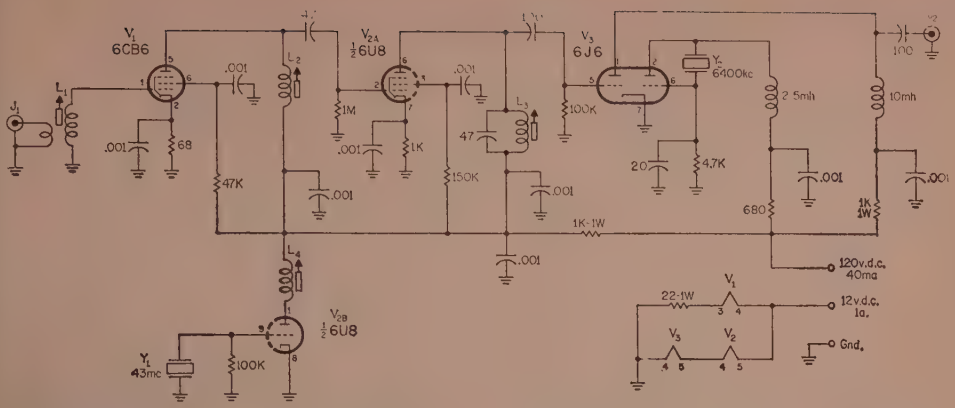


Fig. 1—Circuit of the 6 meter converter with an i.f. output in the broadcast band. All capacitors with values less than one are in mf and are disc ceramics. Values greater than one are in mmf and are tubular ceramics. All resistors are ½ watt unless otherwise noted.

L_1—0.9 to 1.6 mh. with 2 t. #30 en. link. Miller 4403.
L_2—0.9 to 1.6 mh. Miller 4403.
L_3—Same as L_2.
L_4—6.7 to 15 mh. Miller 4406.

battery system. If the unit is to be used in the home station, the power it requires can be obtained from the communications receiver or from the power supply shown in fig. 2.

Alignment

A grid dip meter is essential in the tuning of the converter. A signal generator can also be used, in conjunction with a v.t.v.m. and a receiver, but the procedure becomes painstaking then.

Once the wiring has been checked, the tubes and crystals are placed in their respective sockets and power is applied to the unit. When the tubes have warmed up, check for negative voltage at the grids of the oscillator portions of V_2 and V_3 with a v.t.v.m. Tune the grid dipper to 43 mc and, after turning the unit off, couple the grid dipper to L_4. Adjust this coil to minimum current on the g.d.o. Change the frequency to 50.5 mc and couple the dipper to L_1 and L_2, adjusting these coils for minimum dip also. Again change the dipper frequency to 7 mc and tune L_3 in the same way.

As soon as the coils are tuned, the unit is turned on again and is ready for operation. Connect a six meter antenna to J_1, and P_1 to the antenna terminals of a communications receiver. At this point 6 meter signals should be heard by tuning the communications receiver.

Comments

The converter has a very high sensitivity and should be able to pull in the weakest signals under good conditions. In the vicinity of powerful broadcast stations, broadcast signals might leak through the converter into the receiver causing some QRM. This can be readily remedied by placing a wavetrap, tuned to the middle of the broadcast band, between the receiver and the converter. In cases in which this doesn't help much, tune the wavetrap to the frequency of the station which is causing the QRM, and this should suffice. The image rejection and added selectivity introduced by its inherent double conversion make it worth the extra money it might cost. ■

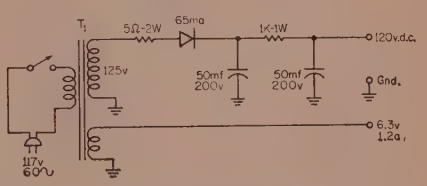
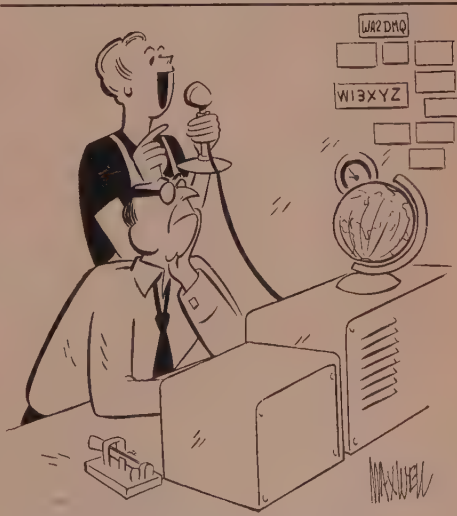


Fig. 2—A simple power supply for fixed station use. If this circuit is used, the filament circuit, shown in fig. 1, must be wired for parallel operation.



"Now, add your spices and enough liquid to cover the meat - - - "

Reviewing The Radio Classics

CCS and ICAS Tube Ratings

BY DAVID T. GEISER*, WA2ANU

Number 1 of a Series

Amateur radio magazines print literally hundreds of radio articles each year, and thousands more are published by the radio trade press. Several of these articles have outstanding and continuing value to the radio amateur from their clear language or complete coverage of a subject.

These articles are often forgotten because the magazine issues are lost; if saved, it is easy to overlook the information because of its ancient date or the obsolete parts used in the examples. Beginners, without a magazine library, never have a chance to mine this store of information.

This begins a series of reviews of past articles published in the United States, each of which in this reviewer's mind has passed the test of time as a classic. Each is applicable to current amateur practice, and will be updated to use current language and components. To the greatest extent possible, the flavor of the inspiring author's presentation will be retained to carry the enthusiasm of his topic. The reviews will appear frequently throughout the year.

Editorially, the review may pick only part of an article, or combine two or more articles, to give a full picture of a limited topic. Good explanations are often buried in descriptions of otherwise obsolete equipment, or may appear in two or more pieces.

Every effort will be made to avoid topics that have been well-covered recently or articles in anthology reprint. Each review, being cut down to one or possibly two pages, will of necessity be a new article which, in this series, may ease the work of a similar reviewer thirty or forty years hence.

The reader's nominations for articles and topics in this series are requested.

THE big news of 1939 in amateur radio tube types was the creation of two sets of ratings for transmitting tubes—known as CCS and ICAS ratings. Few newcomers know the significance of the ratings, and most of the old-timers have forgotten the background. Review of the announcements in the various magazines shows wide similarity, indicating that the basic information was the subject of a widely distributed press release, probably by RCA. All amateur magazines feature the story with varying emphasis, so it cannot be attributed firmly to a single source.

The ham of 1939 saw that allowable power was low with CCS ratings and higher with ICAS ratings. The reason in those times was obvious—CCS stood for continuous commercial service and ICAS meant intermittant commercial and amateur service. Amateurs for a number of years had been commenting that tube companies had been under-rating their tubes, and that, for instance, one could put 75 watts or more safely into an 807 that the manufacturer rated at 60 watts absolute maximum. Fred Sutter, in his "QSL" series of transmitters for *QST*, was rapidly approaching 250 watts input to a pair of 6L6 audio amplifier tubes, as an example.

There was, of course, reason on both sides of the question. The amateur most usually is concerned with a low first cost and high power output from a tube. The tube manufacturer is concerned with possible tube abuse, and wants both a guarantee he can stand behind and a satisfied customer; his concern can be summarized by the word "reliability."

Heat is, and always has been, the main killer of tubes. Heat is caused by power dissipation, and higher dissipations mean shorter life for a given tube. If a customer is willing to give up a certain part of the possible tube life in return for the goals of low cost and high power, a tube can be specified with higher ratings. This is the basis for ICAS service.

How much life is given up is always a question. The original goal was that not more than half the expected life of CCS service be lost in ICAS use. This goal (for a 50-50 chance of survival in CCS ratings) was something over 1000 hours at the time ICAS was introduced, so a reasonable expectation in ICAS service was 500 hours or so operating life. This is roughly equivalent to 2 hours a day, 5 days a week, for a year, taking two weeks off for vacation. It seemed, and amateur practice since has verified, that amateurs might consider this tube life adequate.

There were other factors considered in the ICAS ratings, such as the available pulse power

[*Continued on page 127*]

*Light Military Electronics Dept., General Electric Co., Utica, N. Y.

A Two Band Mobile S.S.B. Transceiver

BY MILFORD C. GOSSARD, C.W.O.*, W3IJF

Here is a compact 15 and 20 meter s.s.b. transceiver designed for mobile operation. It makes use of a homebrew crystal lattice filter and a v.x.o. for high stability. The output stage of the transmitter employs a pair of 6146s.

THIS transceiver was designed for the 15 and 20 meter bands by combining a variety of the desired circuits from several published articles.[1] By careful pruning of the tuned circuits, operation can be extended to ten meters but having no interest in this band I didn't bother.

Circuit Description

A block diagram of the unit is shown in fig. 1. The crystal oscillator, V_1, contains two crystals that are switched for upper or lower sideband. The output is fed to the balanced modulator which is also fed by the output of the speech amplifier, V_5.

The sideband output (either upper or lower) is fed to the homebrew crystal filter which suppresses the undesired sideband. The filter output is then fed to three stages of i.f. amplification. The i.f. output is fed, for the transmit function, to the transmitter mixer, V_7. Also fed to V_7 is the output of the v.x.o., V_6.

The v.x.o. is a crystal controlled oscillator whose frequency can be shifted over a limited range by a variable capacitor. The v.x.o. output can be switched for a suitable frequency to heterodyne the r.f. output to the 15 or 20 meter band. From here on the transmitter is conventional consisting of a driver, V_8, and two 6146's in parallel.

In the receive position the antenna is switched to the receiver r.f. amplifier. This stage can tune across the bands from 15 to 20 meters and the tuning control is a front panel adjustment. Its output is fed to the 6BA7 mixer, V_{14}, whose r.f. grid also contains a front panel control marked MIXER. Also fed to the mixer is the v.x.o. output and thus the receiver is tuned to the same operating frequency as the transmitter.

The output of the mixer is fed to the crystal filter, and in fact, is not actually switched as shown in fig. 1, but is permanently tied in. The same i.f. stages are now used for the receiver section as were used for the sideband generator. The output of V_4 is fed to the product detector, V_{15}. The signal for carrier reinsertion is fed to V_{16} from the crystal oscillator, V_1. Again, there is no actual switching in the i.f. amplifier output. Both V_7, the transmitter mixer, and V_{15}, the product detector, are fed simultaneously.

The output of the product detector is then fed to a conventional audio amplifier.

Circuit Details

CRYSTAL OSCILLATOR AND BALANCED MODULATOR—The oscillator circuit is conventional using one half of a 12AU7. However, active crystals are a necessity in this circuit. The components are shielded within the compartment shown on the left hand front of the chassis. Filament and B-plus leads are bypasssed at the socket and upon leaving the compartment, to prevent carrier leakage. Inductor L_1 is contained in an i.f. transformer shield directly above the compartment, on the top of the chassis. The three turn link of plastic covered wire is loosely coupled to the

*1541 Dual Highway, Hagerstown, Maryland.

[1]Kosowsky, D. I. "High Frequency Filter Design Techniques and Applications", *Proceedings of the IRE*, Feb. 1959, pg. 419.
Vester, H. B., "Surplus-Crystal High-Frequency Filters," *QST*, January 1959, pg. 24.
Vester, H. B., "Mobile S.S.B. Transceiver", *QST*, June 1959, pg. 11.

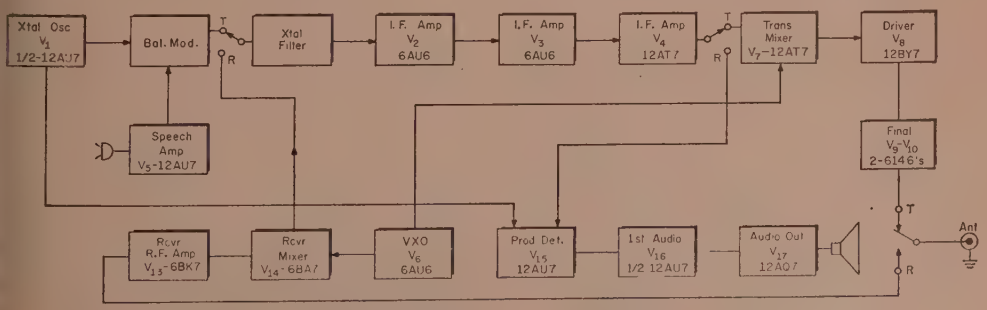
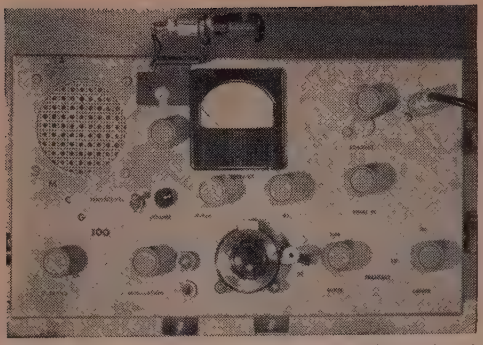


Fig. 1—Block diagram of the two band s.s.b. mobile transmitter. Power supplies are not shown.



Front view of the two band mobile transceiver. The controls, on the lower level, are from l. to r., Sideband Selector, Modulation Level, Tuning, Bandswitch, Trans. Mixer, Driver. The mike connector is to the left of the modulation control and beneath it is the jack of the P.T.T. switch. The second row of controls contain the N.L. On-Off toggle, Receiver Mixer, Receive R.F. and Final Plate. The control to the left of the p.a. plate meter is the R.F. Gain and the right Final Loading. The antenna connector runs to the coaxial antenna relay, K_3 mounted on the side of the unit.

cold end of the oscillator coil and the twisted leads passed through a hole in the chassis directly to the carrier balance pot in the next compartment. This pot and the balance capacitor both have shafts protruding from the left hand side of the chassis where they are accessible to the driver of the vehicle. After a short warm up period the balance adjustments are made and are quite stable. The decoupling network from the audio stage is located within the compartment and a lead is run from T_1 through a hole in the side of the compartment shield. Shielded mike cable or small coax with RCA phone plugs are used with to couple out oscillator voltage to the product detector, and to couple in r.f. from the receiver h.f. mixer stage. The output of the balanced modulator is coupled into the next shielded compartment containing the crystal filter and 6AU6 i.f. amplifier.

Crystal Filter

The filter is almost identical to that described in a previous article,[2] with the exception that the bifilar coil is on a ⅜ inch diameter slug tuned coil form. The coil has a powdered iron core of 1½ inch length. The identity of the coil form is unknown, however, you should select a form with a core at least as long as the winding area (⅞" approx.). The coil has 22 bifilar turns of #28 enameled wire (44 regular turns). The filter is terminate in a 1300 ohm resistor. The value of this terminating resistor and the number of turns on L_2 should be juggled for best band pass characteristics as explained under Alignment.

The spacing between the anti-resonant (parallel resonant) frequencies of crystals and Y_4-Y_6 is 1.5 kc. Crystals Y_4 and Y_5 were etched 1.5 kc higher than Y_3 and Y_6 with ammonium bifloride. The pole to zero spacings (spacing between series and parallel resonant frequency) of the crystals were checked at 2.4 kc as explained in the article.[3] The crystals were checked, after each etching, by comparison with the lower set of crystals. This was done by plugging them into the oscillator circuit and zero beating the lower crystal with a BC-221. Without changing the frequency meter, the etched crystal was plugged into the crystal oscillator, V_1. The audio beat heard in the frequency meter was compared with an audio oscillator connected in parallel with the same set of headphones. The audio oscillator's frequency was adjusted until there was a low frequency pulse beat between the two tones. This method is sufficiently accurate for all practical purposes.

It is necessary to use the crystal oscillator, V_1, but without the correction capacitor which will obviously pull the crystal off frequency. In the unit I constructed, one of the crystals hit right on and required no adjusting capacitor and this crystal socket was used for all frequency checks. If necessary in your case *remove* the adjustment capacitor temporarily.

The 6AU6 amplifier stage is contained within the filter compartment with its output tank above chassis shielded by an i.f. transformer can.

I.F. Stages and Transmit Mixer—The outputs of the 6AU6 i.f. amplifiers are swamped with 15K resistors. The value of these may be altered to provide the amount of circuit gain required and still achieve satisfactory stability. No swamping was used in the 12AU7 cascode amplifier. Incidentally, a cascode stage was used to bring up the gain lost from swamping the previous stages. It does this very nicely. R.f. output from the cascode amplifier branches out to the transmit mixer and product detector. Grid to cathode mixing in the transmit mixer, V_7, is eliminated by relay K_1 in the cathodes. This mixing originally caused a squeal in the receiver even though plate voltage was removed from the tube; hence relay K_1.

Driver and Final Amplifier—The 12BY7 driver and 12AT7 mixer are shielded in separate compartments as shown. Rotors of both tuning capacitors are grounded and no need for neutralization was seen. However, if you are not so fortunate, the output tanks of V_7 and V_8 are sufficiently close to employ link neutralization between them. This neutralization is described in detail in various handbooks.

The final amplifier is biased with two miniature batteries of 9 and 45 volts. These batteries should last at least a year. A 45 volt battery

[2], [3]Vester, H. B., "Surplus-Crystal High-Frequency Filters", *QST*, Jan. 1959, pg. 24.
Vester, H. B., "Mobile S.S.B. Transceiver", *QST*, June 1959, pg. 11.

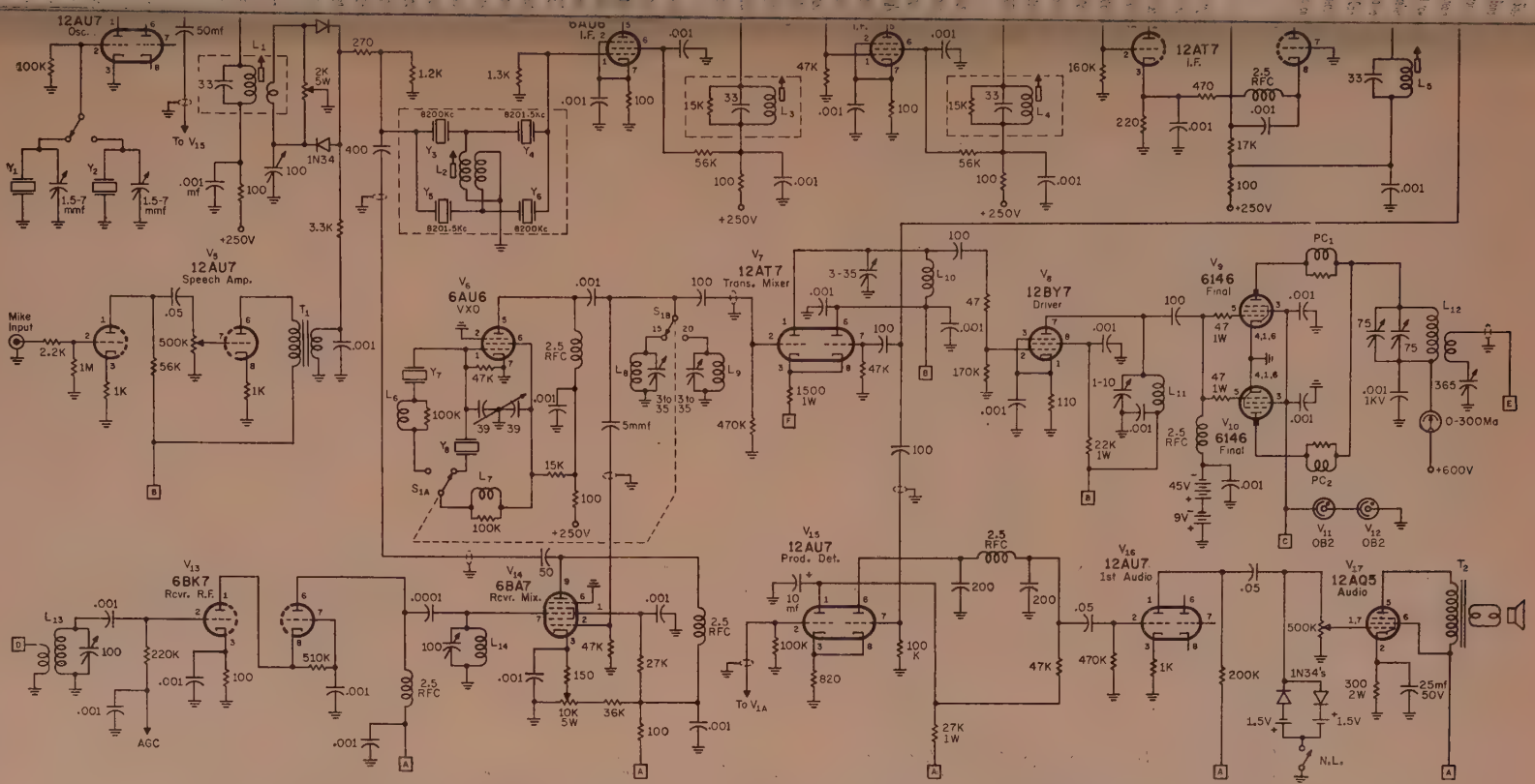


Fig. 2—Circuit of the two band s.s.b. transceiver. The power feeds are labeled to correspond to the markings in the power supply circuit of fig. 3. All resistors are ½ watt and all capacitors are in mmf unless otherwise noted.

L_1—19t #22e. on XR-50 form with 3 turn link on cold end, enclosed in a shield can.

L_2—22 bifilar turns (44 regular turns) #28e. on a ⅜" dia. slug tuned form. See text.

L_3, L_4, L_5—19t #22e. on XR-50 form.

L_6—26t B&W Miniductor #3008.

L_7—25t #22e. closewound on ¾" form.

L_8—9t #14e. on ⅝" plastic form. Winding length, ¾".

L_9—7t Miniductor stock #3007.

L_{11}—7t Miniductor stock #3007.

L_{12}—5t Illumitronic stock #1408T with a two turn link on cold end.

L_{13}—8t Miniductor stock #3007 with two turn link on cold end.

L_{14}—8t miniductor stock #3007.

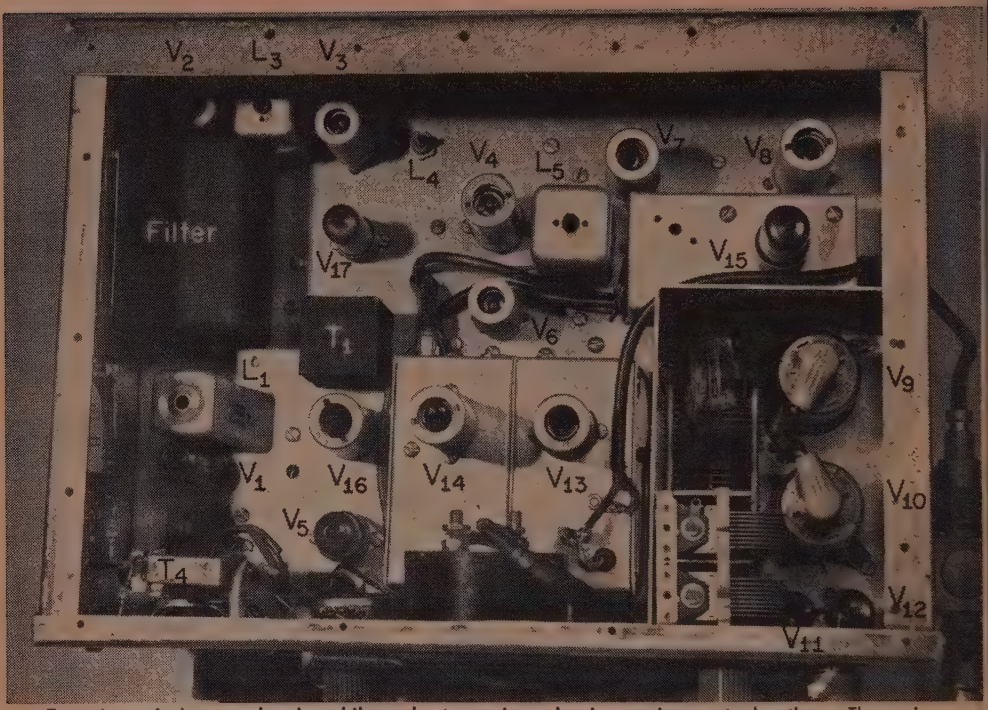
PC_1, PC_2—8t #18e. wound on 47 ohm 1 watt carbon resistor.

T_1—10,000 ohms to 500 ohm audio transformer.

T_2—5,000 ohms to voice coil output tansformer, 5 watts.

Y_1, Y_2, Y_3, Y_4, Y_5, Y_6—8200 kc surplus. FT-243 type.

Y_7, Y_8—See Text.



Top view of the two band mobile s.s.b. transceiver showing major parts locations. The noise limiter diodes and batteries are located on the left front sidewall. Oscillator crystals Y_1 and Y_2 are plugged into the octal socket in front of V_1.

was not quite enough with the plate voltage available from the Heathkit MP-1 power supply. The plate current is swung to 250 ma on 20 meters and about 200 on 15 meters providing quite a sizeable signal.

RECEIVER FRONT END—Each stage (r.f. and mixer) is mounted on individual subchassis centered on the main chassis just behind the front panel. Each chassis contains one of the two tank circuits (L_{13} and L_{14}). A 0.001 capacitor couples the 6BK7 plate to L_{14} through a grometted hole between the chassis. Power and the h.f. mixer r.f. voltage is brought into the mixer chassis through a grometted hole to the rear of the subchassis. A phone plug and coax carries the output of the mixer to the crystal filter. Incidentally the properties of the coax used are unknown, however, RG-59/U should be proper.

Only one tuning capacitor and one coil per stage was used to tune both bands. Naturally a loss in gain per stage resulted from this, so an additional i.f. stage was added to make up for the loss. Utilizing 3 i.f. stages also permitted swamping of the stages. Neutralization of the i.f.'s might have improved the sideband rejection somewhat. However, without it the rejection was at least 30 db as checked on the 75A-3 with 3 kc filter.

V.X.O.—The v.x.o. crystals are the same as those used in the Shall V.X.O.[4] and can be obtained from the Piezo Crystal Co., Carlisle, Pa. For 20 meter operation the crystal operates at 11,250 kc and the oscillator plate circuit is tuned to twice this frequency. The crystal may be "pulled" some 30 kc resulting in a coverage from 14,370 kc to 14,300 kc. It would be best to order a crystal 10 to 20 kc higher in frequency to allow for the circuit capacitances. Be sure to consult Piezo about this when ordering the crystals or you and Piezo may both make the necessary allowance and you'll end up out of the ball park frequency wise. The crystals can be tailored, for a small fee, after you have checked your coverage.

The 15 meter crystal has a nominal operating frequency of 14,825 kc including stray capacity. A 50 kc coverage was obtained on this band compared to 30 kc on 20.

More coverage can be obtained by increasing the turns on L_6 and L_7. However, as the coverage is increased the stability decreases. The 100K resistors are for swamping and prevent spurious oscillations. With the values shown, spurious oscillations are killed and, the oscillator provides approximately the same output voltage across its tuning range.

The product detector and audio stages are conventional and require no explanation. The diode noise limiter was added as an afterthought since ignition noise is fierce on Oahu, Hawaii (where this unit was in use). It helps

[4]Shall, H., "VXO-A Variable Crystal Oscillator", *QST*, Jan. 1958, pg. 11.

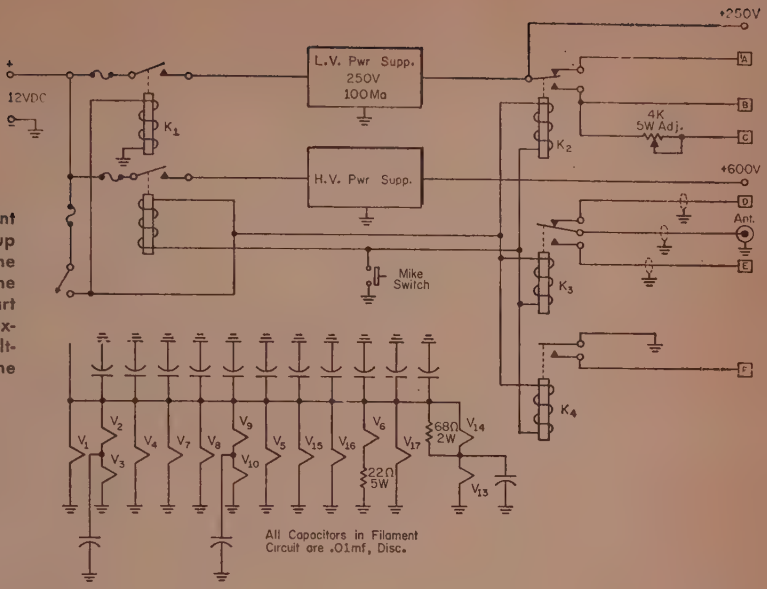


Fig. 3—Power supply, filament wiring and control circuit set-up for the mobile transceiver. The unlabeled relay controlling the Heath high voltage supply is part of that kit and is rewired as explained in the text. The low voltage power supply used by the author was a dynamotor

somewhat; however, it attenuates the signals quite a bit. Perhaps higher bias would eliminate this and provide adequate limiting. With a filtered battery supplied from the car system, fed through divider networks, a more satisfactory noise limiter could be built, with variable attenuation.

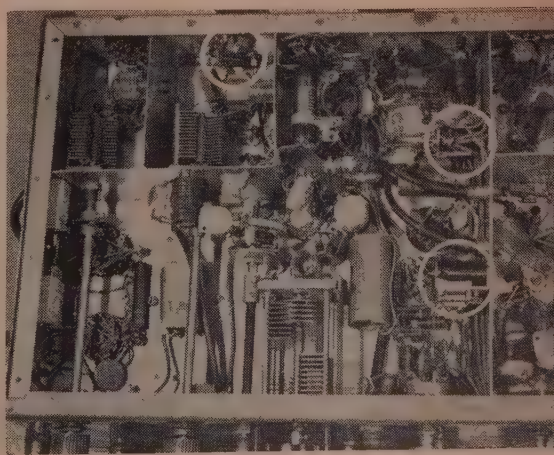
Power Supplies—The power supplies used are of the standard variety and a diagram of the arrangement is shown in fig. 3. The low voltage unit must supply 250 volts at 100 ma and can be a transistorized job or of the vibrator type. I used a dynamotor with the control relay, K_1, mounted close by in the motor compartment. The high voltage supply is the Heath MP-1 and the only modification necessary was to shift the control line for the relay from the hot side of the coil to the ground side so that it corresponded with the rest of the control circuit.

If a dynamotor is used for the 250 volt supply add a 40 mfd 450 volt electrolytic from the arm of K_2 to ground in fig. 3. The function of the 100 ohm resistors in some of the B plus feed lines was to help in trouble-shooting B-plus shorts when using the dynamotor supply. If another type of supply is used all the 100 ohm resistors may be omitted.

Alignment

The i.f.'s are aligned simply by adjusting L_1 to start the oscillator, V_1. The carrier pot is then unbalanced and a v.t.v.m. (with an r.f. probe) or a receiver is connected to the output plate of V4, 12AT7, the cascode i.f. amplifier. Adjust inductors L_3, L_4 and L_5 for maximum output.

Filter adjustment is quite simple after the crystals have been ground to the correct frequency as previously described. A BC-221 output is injected into the grid of V_1 and tuned through the passband frequency of the filter. A vacuum tube voltmeter is again connected to the plate of V_4 at the high side of L_5. The



Bottom view of the 15 and 20 meter s.s.b. transceiver shows compact construction and compartmentation. The upper left compartment contains the oscillator, V_1, and below it is the balanced mixer compartment which contains the two balancing controls. The lower left compartment houses the crystal filter and V_2, the first i.f., which is constructed on a vector socket. The lower right compartment contains the transmitter driver circuit and the compartment alongside houses the transmitter mixer. Relay K_4 can be seen circled on the rear wall of the mixer compartment. The bias batteries for the final may be seen mounted in the upper right area on the chassis and sidewall. The circled relay mounted on the side of the oscillator compartment is unused as its function was eliminated by design refinement. Relay K_2, also circled, is mounted on the outside wall of the crystal filter compartment.

excursions shown on the meter as the BC-221 is tuned across the bandpass indicates the start and stop frequencies of the filter. A receiver, with an S meter, tuned to 8200 kc can be used for the same purpose. At the first check a valley may appear in the center of the passband. If so, the bifilar coil should have turns removed until the valley disappears almost completely. A 3 db dip in the center is not detrimental. The terminating resistor may also be changed to various values, each time checking the passband for improvement. The core of the bifilar coil is *not* adjusted. The core must be centered on the winding to eliminate any capacitive unbalance.

Crystals Y_1 and Y_2 should be etched or padded to ride approximately 20 db down on the two skirts of the filter. Crystal Y_1 is made to oscillate on the low frequency slope of the filter passband by adjusting its parallel capacitor. Crystal Y_2 is etched so that it oscillates on the upper frequency slope of the filter passband. If you etch a little too far the crystal can be juggled by loading it with a lead pencil mark or two or by adjustment of the parallel capacitor.

The v.x.o. plate tank circuits are best adjusted by tuning in the signal on the station receiver and adjusting the capacitors paralleling L_8 and L_9 for maximum S-meter reading. This will eliminate capacity loading by the v.t.v.m. probe at these high frequencies. Alignment of the transmit mixer, driver and final amplifier is best done in the same manner thus preventing you from tuning up on a harmonic.

General Construction Notes

The transceiver is built on a standard 3 × 10 × 14 inch aluminum chassis. The front panel is made of #14 or #16 gauge soft aluminum and has ⅜ inch lips bent on four sides. Approximately ⅛ inch clearance is allowed so as to accept the two side panels of the cabinet. The side sections are constructed of the same material with lips at the top and rear edges only. The front edge of these sections are fitted between the chassis and the front panel side lips. The rear section has only one lip at the top. This lip should be wide enough to accommodate hinges if desired.

All sections are secured with sheet metal screws. A swivel type panel light was included to read the meter and permit tune-up at night.

The 6AU6 filter amplifier, V_2, is constructed on a turret socket. The socket was wired externally and then inserted into the compartment.

The miniductor stock was held securely, in place, by gluing them to transistor plastic tube containers. A proper size plastic medicine bottle can serve just as well. Relay K_1 is a miniature 12 volt unit and it is located in the transmit mixer compartment on the rear wall of the chassis. Leads lengths to the points of the relay should be kept to a minimum.

Crystal Y_7 and Y_8 have solder lugs soldered to the crystal can and the lug is then bolted to the chassis with 6-32 screws.

The bias batteries for the final amplifier are held to the chassis with fabricated flat U straps. The 1½ volt batteries for the limiter are penlight cells and are held by a standard holder which was purchased from a model airplane hobby shop. The subchassis for receiver r.f., mixer and product detector are 1½" × 2" × 4" miniboxes.

Conclusion

I have had many contacts with this rig since it was completed and these have produced many favorable reports. Many have asked if I was using the KWM-1. Naturally, this made me feel quite good, especially when I can say "This little rig cost me less than a hundred bucks." ■

MARS Chiefs Plan Armed Forces Day Competition

CAPTAIN A. N. Cole, U.S.A.F., W4IYR; Major H. C. Becker, U.S.A. and Lieutenant Commander C. R. Winnette, U.S.N.R., all respective chiefs of their MARS programs, confer on the details of the up-coming Armed Forces Day event to be held Saturday, May 18. A c.w. and RTTY receiving competition will be held as well as the usual cross-band operation with AIR, WAR, and NSS. Watch *CQ* for further information.

Lamp Characteristics for Dummy Loads

WILLIAM J. AULL, JR.*, W8YGL

There has long existed a need for ready reference material on available lamps for transmitter loads. The author has carefully researched catalogues, employed Ohm's law and compiled a detailed listing.

THE use of lamps as dummy loads has long been common in the amateur ranks. While the characteristics exhibited by lamps frequently tend to vary with the applied r.f. voltage and frequency, their ease of availability brings them into wide usage. Since there are so many types of bulbs available, each with different characteristics, a certain amount of confusion is created, particularly in the low and high power rating areas. Below is a listing of a variety of lamps suitable (within the limitations previously mentioned) for dummy loads on transmitters of various power output capabilities.

Transmitter Watts	Resistance Ohms	Lamp Number	Ratings Volts	Amps.
0.10	33.0	48, 49, 352	2.00	0.06
0.25	5.5	112	1.20	0.22
0.50	8.8	222, 223	2.20	0.25
	9.7	224	2.15	0.22
	11.0†	112	1.20	0.22
	20.0	1490	3.20	0.16
0.75	2.2	136	1.30	0.60
	8.35	14	2.50	0.30
	33.3	502	5.10	0.15
1.0	4.8	PR-2	2.4	0.50
	9.1	42, 45	3.2	0.35
	10.0	13	3.7	0.30
	10.0‡	1490	3.2	0.16
	30.0	328, 1768	6.0	0.20
	42.0	12, 1847	6.3	0.15
	45.0	40	6.8	0.15
	47.0	47	7.0	0.15
2	3.12	248	2.5	0.80
	5.0‡	13	3.7	0.30
	7.2	PR-3	3.6	0.50
	10.0	PR-13	4.7	0.47
	15.0‡	328, 1768	6.0	0.20
	60.0†	328, 1768	6.0	0.20
	120.0	53	14.4	0.12
5	25	OZ4S11	10.0	0.40
	72	432, 433	18.0	0.25
	80	1458	20.0	0.25
	165	313	28.0	0.17
	2400	6S6	120.0	0.05
10	36‡	432, 433	18	0.25
	40‡	1458	20	0.25
	144†	432, 433	18	0.25
	1200‡	6S6	120	0.05
	1500	10S14, 10S11N	120	0.08
15	60	15A	30	0.50
	240	15A	60	0.25
	375	15A	75	0.20
	960	15A15, 15FC	120	0.12
	1306	15T6	140	0.1
25	36.0	25A	30	0.83
	46.5	25A	34	0.73
	146.0	25A	60	0.41
	227.0	25A	75	0.33
	576.0	25A	120	0.20
30	1.2	5A/T8SCP	6	5.00
	30.0‡	15A	30	0.50
	120.0†	15A	30	0.50
	139.0	30S11DC	64	0.46
	480.0	30/230M	120	0.25
50	18	50A21	30	1.66
	23	50A21	34	1.47
	72	50A21	60	0.83
	72†	25A	30	0.83
	288	50A	120	0.41
	292†	25A	60	0.40
	1527	50A19/35	275	0.18
	1875	50A19	300	0.16
60	2.4†	5A/T8SCP	6	5.00
	70.0‡	30S11DC	64	.46
	240.0	60A	120	.50
	240.0‡	30/230M	120	.25
75	1.3	7.5/T8SCP	10	7.50
	192.0	75A	120	0.62
100	0.33	18A/T10/2P	6	18.00
	4.0	5A/G16½/3	20	5.00
	9.0	100A	30	3.30
	36.0	100A	60	1.66
	46.0†	50A21	34	1.47
	144.0	100A	120	0.83
	144.0†	50A21	60	0.83
	763.0	100A	275	0.36
	909.0	100A	300	0.33
150	6.8	150 PAR46/1	32	4.68
	88.0	150 PAR46	115	1.30
	96.0	150, 150A	120	1.25
	96.0‡	75A	120	0.62
200	8†	5A/G16½/3	20	5.00
	18†	100A	30	3.30
	72	200	120	1.66
	72‡	100A	120	0.83
	288†	100A	120	0.83
	381	200	275	0.72
	454	200	300	0.66
	1526†	100A	275	0.36
300	13.6†	150PAR46/1	32	4.68
	48.0	300, 300M	120	2.50
	177.0†	150PAR46	115	1.30
	192.0†	150, 150A	120	1.25

*460 Grove St., Morgantown, West Virginia.

†2 lamps of listed type in series.

‡2 lamps of listed type in parallel.

Unmarked values of resistance indicate single lamps of any type listed. Lamps 10 watts and smaller are listed in the Lafayette catalog. Lamps 10 watts and larger are listed in the General Electric catalog "Large Lamps", #602-7156.

The National NC-155

BY BOB MEYER*, W2UJJ AND ART SEIDMAN†, K2BUS

NATIONAL Radio's new receiver, the NC-155, has many features which makes this a fine instrument for the serious amateur. The 10 tube double conversion (2.215 mc, 230 kc) receiver exclusively covers the ham bands from 80 through 6 meters. An r.f. stage is included and product detection is used for c.w. and s.s.b. reception. Selectivity is controlled from 5 kc to 600 c.p.s. by a Ferrite Filter. The reviewers were pleased with the exceptionally fine bandspread and stability of the receiver. Image rejection and selectivity were judged to be good; sensitivity was 1 uv for 1 watt output. A full-wave rectifier and a voltage regulator tube make up the power supply. A complete tabulation of the receiver's specifications is given in Table I.

Front view of the NC-155. The controls are (bottom row) l. to r., ANTENNA, BANDSWITCH, FUNCTION, SELECTIVITY, STBY-REC. switch, AUDIO GAIN. Top row, l. to r., RF GAIN, MAIN TUNING, BFO. To the right of the S-meter, CALIBRATE Switch. Below the STANDBY-REC. switch is the phone jack.

Circuit Description

Referring to the block diagram of fig. 1, a 6BZ6 (semi-remote cutoff pentode) serves as an r.f. amplifier. The oscillator section of the first converter, a 6BE6 pentagrid tube, operates 2.215 mc higher than the incoming signal and temperature compensating capacitors are used in its series-fed Hartley circuit.

The second converter (6BE6) converts the incoming first i.f. signal from 2.215 mc to 230 kc. Here, a series-fed Hartley is employed as a fixed frequency oscillator operating at 2.445 mc.

A 6BA6 pentode is used for each of the 230 kc i.f. stages. The output from the 2nd i.f. is fed to one diode section of the 6T8 (duo-diode, triode) which is the a.m. detector. It also furnishes delayed a.g.c. This a.g.c. voltage is returned to the 1st i.f. and r.f. amplifier stages. The other diode section of the 6T8 serves as an automatic series-gated noise limiter (a.n.l.).

*6015 Fifth Ave., Brooklyn, N. Y.
†238-73 116 Rd., Elmont, N. Y.

The product detector, used for c.w. and s.s.b. reception, derives its signal from the 2nd i.f. stage. One half of a 12AX7 (high mu duo-triode) is the product detector; the other half is employed in a shunt-fed Hartley b.f.o. circuit. B.f.o. pitch control is achieved by a panel-mounted slug tuned coil, which varies the frequency ± 4 kc, centered about 230 kc.

The 1.5 watt audio power amplifier (6CW5) is driven by the triode section of the 6T8. Headphones or a 3.2 ohm external speaker may be used.

D.c. power is supplied to the receiver from a 5Y3 full-wave rectifier circuit. RC filtering is used and an 0B2 regulates the conversion oscillators, the b.f.o. and the product detector. Total power consumption from the 117 volt line is 75 watts.

The S-meter is connected between the plate decoupling resistors of the 1st and 2nd i.f. stages. The voltage drop across the decoupling resistor of the 1st i.f. varies with the a.g.c. voltage, causing the S-meter to read. The meter, which is calibrated in S1-9 units and up to 80

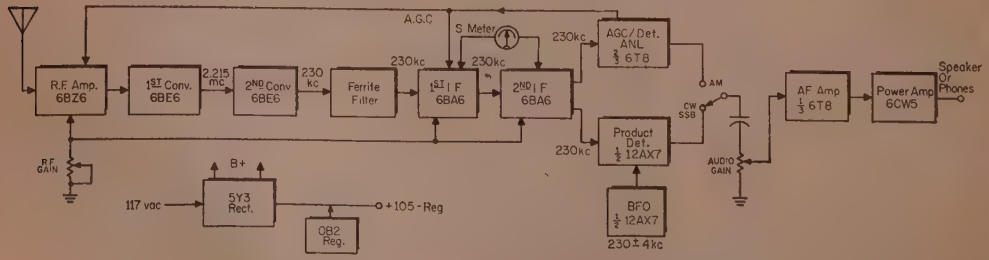
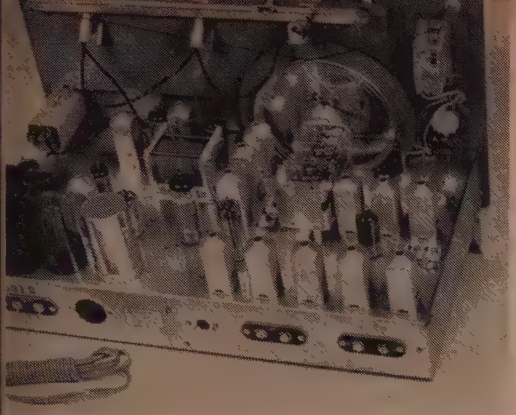


Fig. 1—Block diagram of the NC-155 receiver.



Rear view of the NC-155. Along the chassis apron, l. to r., relay terminals, accessory socket, S-meter zero-adjust control, speaker terminals, antenna terminals. The ferrite filter is left of center on top of chassis. The aluminum filter dust cover was removed for photographic purposes.

db above S9, only functions when the a.g.c. is switched on.

A pair of terminals and an accessory socket are available at the rear of the chassis for remote operation. In the standby mode, the r.f. amplifier, 1st and 2nd i.f. stages, and the audio amplifier are muted.

A 1 mc crystal calibrator is available from National as an accessory.

Mechanical Construction

The receiver is mounted in a stylish blue-gray metal cabinet 8⅝" high by 15⅝" wide by 9" deep. A *Flip-Foot* on the cabinet permits the set to be used in a tilted or flat position. The ⅛" steel panel ensures good operating stability. The receiver can be easily removed from its enclosure.

A large fiber disk, attached to the tuning capacitor shaft, is rim driven for a 12/1 tuning ratio. An additional 5/1 tuning ratio is realized by a panel vernier resulting in an overall 60/1 ratio. A drum, also attached to the tuning capacitor shaft, works the dial string system to move the pointer across the dial. No backlash was observed.

Receiver Performance

The NC-155 has a number of commendable qualities which now will be enumerated. These are:

1. The tuning is very smooth and the bandspread is excellent.

2. Drift tests were performed on all bands. A laboratory-type v.f.o. was calibrated against a 100 kc crystal and set to a frequency in the band tested. The receiver, in the c.w. mode, was then tuned and zero beat with the v.f.o. signal. At certain time intervals, the v.f.o. was varied to zero beat in the receiver, that is, made to follow the receiver drift. After 8 minutes from a cold start, a maximum drift of 1.7 kc was observed on 10 meters and it was stable thereafter. See Table II for a complete summary of results.

3. Selectivity curves for the receiver, as given by the manufacturer, were plotted between 0 and −40 db. From this data, the bandwidth at the −6 and −40 db points are listed in Table III.

4. AGC: for −80 db signal variation (100,000 μv to 10 μv) the change in audio output was −9.25 db. This is considered to be satisfactory.

On the negative side of the ledger, the receiver exhibited only the following fault:

The 12th harmonic (29.34 mc) of the fixed frequency 2nd conversion oscillator was heard at the upper end of the 10 meter band. In addition, two other harmonics came through on six meters.

Conclusions

Considering the price tag, the NC-155 is a real performer and should afford a great deal of pleasure to its user. The many fine qualities of the receiver: stability, smooth tuning, etc., outweigh its faults. Lack of 160 meter operation may make some of its adherents unhappy.

The instruction manual is clearly written and well illustrated. Detailed alignment instructions and a parts list are included. For some reason, however, a tube-pin voltage chart was omitted. This can make receiver troubleshooting a rough chore. ■

Table I: NC-155 Specifications

Frequency Ranges	6 meter band (50.0-54.0 mc) 10 meter band (28.0-29.7 mc) 15 meter band (21.0-21.5 mc) 20 meter band (14.0-14.4 mc) 40 meter band (7.0- 7.3 mc) 80 meter band (3.5- 4.0 mc)
Circuit	1. 10 tubes, including rectifier and v.r. tube. 2. Double conversion superhet. I.f. frequencies are: 2.215 mc and 230 kc. 3. One r.f. stage.
Sensitivity	Better than 1.0 μv for 1 watt output.
Selectivity	600 c.p.s., 3 kc, and 5 kc.
A.G.C.	Operates in a.m., c.w. and s.s.b. positions. May be disabled for manual control.
Detector	For a.m.: diode detector; for c.w. and s.s.b.: product detector.
Audio	1. 1½ watts output. 2. Speaker: external, 3.2 ohms. 3. Headphone jack mounted on front panel.
Power Requirements	75 watts, 105-125 volts, 50-60 c.p.s.
Price	$199.95

Table II: NC-155 Drift Characteristics

Band	*Drift in kc*
80 meters	1.1*
40 meters	4.5**
20 meters	0.54*
15 meters	0.60*
10 meters	1.7*
6 meters	30.0**

*Stabilized in 8 minutes from a cold start.
**Stabilized in 40 minutes from a cold start.

Table III: NC-155 Selectivity Characteristics

Selectivity at:	*−6 db*	*−40 db*
	5 kc	16.6 kc
	3 kc	13.5 kc
	0.6 kc	5.8 kc

Air-To-Ground Phone in '24

BY A. DAVID MIDDELTON*, W5CA

I HEARD Dick Russell whistle as he approached my shack at the rear of the house. Dick rapped on the door and when he heard my "Come in!" he stepped into the shack. There he found me, busy as usual, my fingers flying as I operated the key.

"Howdy, old man!" Dick greeted me.

"Hang your hat, my friend, and have a chair. Be through in a minute—QSO a PY."

Dick Russell was used to my bluntness. He had spent many evenings in the ham shack and although he was not a ham himself, he had picked up enough of the lingo and ham terms to understand me. He was fast becoming interested in getting a license and a station. He had already mastered the code and could receive slowly-sent c.w.

Dick amused himself by trying to read the clicking of my hand key, but found it hard going. Then, when I sined over to the Brazilian, Dick tried to copy again, and with fair success, the signals whistling from the extra pair of headfones he took from the hook on the wall.

The contact ended and after I made notes in my log book I pushed back from the operating table and shoved my fones up over my temples as I leaned back in the chair.

Dick knew these signs. I was fed up with the band and in a mood, and he knew I would not spend this evening hunting DX, but in all probability would spend the time telling ham tales. All it would take, Dick knew, was to prime me to get me started!

We 'yakked' a while and then, outside and from a distance, came a dull roar. The noise grew rapidly louder. Dick looked up and I said, "Sounds like a plane! What do you think?"

Dick did not reply but quietly stepped to the door and flung it open. A blanket of fog was closing in on the ground. From not far off the steady roar of an airplane motor drummed its way through the night. The noise grew deafening—then in a few moments a plane thundered over. Its prop-noise was terrific although the wing lights were just barely visible through the fog.

"Gosh, that pilot's in a jam!" Dick said, half to himself.

"Yes, sort of a pinch! But he'll get in okay. You know, the radio beacon passes directly over us here. He's right on course."

"Sure, I know that, but I thought they had to fly higher than this feller. Gosh, he was almost on the roof." Dick laughed.

"Well, you can't blame him. This fog gets pretty bad here only a mile from the lake. That pilot was probably using the street lights as well as the radio beacon, to come in on. He sure sounded low, alright. But he was higher than we thought, I bet." We stepped back into the warm shack and Dick closed the door. "The noise from an airplane motor still gives me a thrill, Dick. That roar reminded me of an incident that happened back in the old days."

Dick Russell did not say anything. That plane had primed me. Now, all my visitor had to do was sit back and listen.

"Yes sir! That roar made me think of the Barling Bomber. I guess you never saw that plane. No, likely not, for she was decommissioned and placed in a museum long before your time." I leaned back and relaxed in the old revolving operating chair. Then I continued, "One afternoon in the fall of 1924 when I was living in Indianapolis I was in my shack and just killing time until I was to leave to take my YL to a football game. I had been talking to a few locals on my c.w. and fone outfit. You know, Dick, in those days, we were operating on 150 meters and it was not unusual to talk a couple hundred miles in daytime on voice, with loop-modulation! I was just sitting there, idly twisting the old micro-vernier dial, when a loud voice burst into my fones. At first, I could not quite believe what I heard. Then the truth dawned and I sat still and listened.

" 'Hello Indianapolis! Hello, Indianapolis!' the voice rang out clearly and with lots of volume. I tuned it in and then I heard the station sine. I grabbed my call book, and ran my eye down the list in which that call should have been. No such call was listed! But I didn't wait. I snapped on the transmitter, tapped the carbon-mike on the desk, and answered the call.

"I called a couple of times and sined. This time it answered my call! After acknowledging me, a loud, clear voice went on—

" 'This is the Barling Bomber! Sgt. Thomas Smith speaking. We are passing over Richmond, Indiana, enroute to Chanute Field, Illinois. We will pass directly over Indianapolis. Have you a land telephone?'

"I was dumbfounded! I had seen pictures of that huge Bomber, which was a multi-winged and multi-motored job and was the Army's newest plaything. It was normally quartered at Dayton. And it was the largest plane in the world!

"As quickly as I could, I answered Sgt. Smith and told him that I had a land telephone, but it was downstairs. I also asked what I could do for him.

"Back came his reply. 'We are now nearing

*Tijeras, New Mexico

The Barling Bomber

Cambridge City, flying 120 miles an hour. Please stand by!'

"There was a moment's pause. Then I heard another voice speaking to me. 'This is Lieutenant Harrison,' the voice began, 'in command of the Barling Bomber. We are flying towards Indianapolis and should arrive over you shortly. Mrs. Harrison is in St. Vincent's Hospital in your city. She is critically ill. She has a receiving set and can listen to our radio if the nurse will tune it in for her. Would you please call the hospital immediately. Try to persuade the nurse to tune our signal in so that I can speak directly to my wife. I think my voice would do much to cheer her even tho she can't speak to me.'

"The air-borne station stood by. I told him I'd be glad to do what I could. After requesting that he stand by I dashed downstairs to the telephone. There was nothing like a fone-patch then! It didn't take long to get the hospital and thru to Mrs. Harrison's nurse. At the time, it never dawned on me just how much of a v.i.p. this Mrs. Harrison was, but she had a fone in her private room. I explained the situation to the nurse and while she did not seem to believe me, or understand what it was all about, she said she would turn on the radio receiver and tell her patient that Lieutenant Harrison would speak to her.

"I went back to my shack and soon had contact with the Bomber. By now the roar of its giant Liberty motors could be plainly heard directly through the air. Strangely, little motor noise came through the mike on the plane. They had a fairly sound-proof radio cabin aboard. Lieutenant Harrison was quite pleased at the results of my phone call. He asked me to guide them to the hospital. He told me they could not land at Indianapolis, as much as he wanted to, as they were on an important test flight under orders to proceed from Wright Field, Dayton, direct to Chanute Field. He also requested that I listen to the plane and take down the message he would broadcast blind to his wife. Just in case she could not hear him speak.

"The plane droned nearer and soon, from my window, which luckily opened towards the east, I could see a speck in the sky, which grew larger with each passing second. We kept up a running fire of conversation and I gave them exact directions to the hospital. The Bomber was flying high over the city and they did not wish to come lower as the noise of its many motors (it carried eight Liberty engines), would disturb the people and especially the patients in the hospital when the plane flew over the building.

"The plane passed over my house and climbed to gain altitude to fly over the city. I lived on the east edge of town and some five miles from Monument Circle, which is Indianapolis' center. There the plane would turn north and fly towards Fall Creek and the hospital which stood on its north bank.

"When the plane reached the Circle, the Lieutenant told me he had sighted the hospital, and that they were heading north for it.

"Then in a minute or two, I heard him speak to his sick wife. It wasn't the stiff, precise military voice speaking. It was the voice of a worried man whose wife was very ill. I could tell that he was anxious even though he tried to be cheerful. What I did not know, was that Mrs. Harrison was very close to death and while she herself did not know the facts, her husband did. I took his message down, word for word, as the plane circled over the hospital. After that brief interruption in the flight, the huge Bomber turned back and headed west for Terre Haute and over to its Illinois objective. When Lieutenant Harrison finished his message he left the radio and Sgt. Smith came back on. We talked for awhile.

"Finally, I had to switch to code as my fone was getting weak in the plane, probably due to my low efficiency loop-modulated fone. As the plane sighted Terre Haute, Sgt. Smith sined with me and began to call Chanute Field. I kept listening for awhile, then took the written message and went downstairs to the telephone.

"I finally got the nurse on the land line again and this time she was more understanding. I asked her if Mrs. Harrison had heard the Lieutenant speak to her. She told me that they had only heard part of it. Something had gone wrong with the receiver and it had cut out on some parts of the message. That was just what Lt. Harrison had feared and that is why he had me write down what he said. The nurse took down the entire message verbatim and I made her promise that she would read it to

[*Continued on page* 102]

Factors In Choosing A Microphone

BY WILFRED M. SCHERER*, W2AEF

A considerable investment often is made in a top-quality phone transmitter with little concern given to the selection of the right microphone to go with it. The author discusses the considerations which should be taken into account in this regard. The characteristics of a number of popular microphones, used for amateur service, are also given.

THE selection of the right microphone depends upon several factors. One of these is the type of transmission, a.m., or s.s.b. Selectivity needed for the reception of a.m. signals on the crowded phone bands with ordinary receivers is obtained through the use of sharply peaked i.f. systems which, unfortunately, attenuate the high frequency components of the modulated signal and make the detected voice sound muddy and unpleasant together with poor intelligibility. This fault may be counteracted by the employment of "pre-emphasis" at the transmitter, that is, raising its h.f. audio response to make up for the loss experienced in the receiver. One way of doing this is to use a microphone which has a rising or peaked frequency characteristic in the upper region of the voice-frequency spectrum.

Many of the better modern receivers have i.f. systems which provide either a 3 kc flat bandpass characteristic for s.s.b. (3 kc is the highest a.f. needed for good voice intelligence), or a 6 kc bandpass for a.m. (3 kc for each sideband). These characteristics ensure a reasonably flat response for either mode of reception, in which case pre-emphasis is not necessarily an advantage, except when added crispness may be desired.

Single Sideband

When s.s.b. is involved, other considerations must be taken into account. These are the maintenance of unwanted-sideband suppression and the minimization of sideband splatter beyond 3 kc from the operating frequency.

When a phasing-type of amateur s.s.b. transmitter is used, unwanted-sideband suppression deteriorates considerably at audio frequencies below 300 c.p.s. and above 3000 c.p.s. In this case "de-emphasis" by means of a microphone having sharp cut-off response below 300 c.p.s. and above 3000 c.p.s. will enhance the chances of maintaining good sideband suppression. Also, the possibility of splatter beyond 3 kc on either sideband will be minimized (an advantage for a.m. also).

With a filter-type of s.s.b. system the r.f. sideband filter effectively is also an a.f. filter. Unwanted sideband suppression (mostly of the low audio frequencies close to the operating frequency) and adjacent-channel splatter from the higher audio frequencies depends upon the bandwidth and shape factor of the sideband filter and on the placement of the carrier-generator frequency in relation to the filter's passband. These conditions will largely determine the effectiveness of a band-pass microphone for the realization of better suppression and the minimization of splatter.

Useful Talk Power

Another consideration for both a.m. and s.s.b. operation is the attainment of maximum useful talk power. With the average voice, maximum energy is produced at the lower frequencies (near 100 c.p.s.). This energy drops off quite rapidly as the voice frequency is increased up to between 500 and 1000 c.p.s., where it levels off to a gradual decrease through the upper-frequency range.

If a transmitter is adjusted for proper modulation (100% for a.m., or just below "flat-topping" or maximum allowable-peak power for s.s.b.), the setting of the audio gain will be determined by the peak amplitudes of the lowest-frequency sounds, because these are the ones which produce the highest power. But, at the same time, the higher-frequency sounds (at the same audio setting) will be transmitted at lower than maximum-possible levels or at lower peak power, because of their smaller amplitudes.

Unfortunately, the lower voice frequencies, although they may determine the "loudness" of a signal to the ear, contribute little to voice intelligibility, while the upper voice frequencies contain the important consonant sounds which are required for intelligibility. Thus, maximum intelligence or talk power is not realized because of the limitations imposed by the high amplitudes of the lower useless frequencies.

If the lows are attenuated prior to the modulation process, the audio gain may be raised up to a point where the maximum allowable-power peaks will occur at frequencies closer to the higher useful ones which can then be

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transmitted at higher average peak-power levels. One means by which this may be done is by the use of a microphone which attenuates the lows and/or has a slightly rising response from 500 or 1000 c.p.s. up to about 3000 c.p.s. The response should otherwise be relatively smooth and devoid of high peaks.

Operator's Voice Characteristics

The characteristics of the individual operator's voice also should be taken into account. If the voice is predominant in low-frequency components and sounds bassy or highly resonant, the use of a l.f. cut-off microphone will be more effective than with a voice which lacks the lows; however, in any case, some benefit may result, even with female voices which can drop down as far as 200 c.p.s.

If the voice exaggerates the highs and sounds hissy or breathy, it can cause poor sideband suppression or splatter beyond the 3 kc bandwidth. A microphone with a h.f. cut-out characteristic will be helpful in eliminating such faults.

Other Methods

The use of a microphone with special characteristics is not the only means which can be used for a particular a.f. response. High and low-pass filters or simple *RC* roll-off networks are often used in the audio sections of transmitters. Where these are not already in use, and the operator has neither the inclination, the know-how nor the equipment for following through with such arrangements, the right choice of a microphone may be a simple solution, and can go a long way toward the production of clean, intelligent and efficient signals.

Restricted a.f. response can make a voice sound unnatural, and many operators may be told that their voices do not sound the same as when actual person-to-person conversation is conducted (a basic trait of many s.s.b. systems). Thus, preference may be given to the use of a wide-range microphone for the more natural sound. Intelligent use of such a microphone, as described later, and the use of simple *RC* filters[1] for slight roll-off characteristics should provide a good compromise between the transmission of signals expressing a personality and of those having a high degree of intelligence.

Room Reverberation

If a microphone is used in a room which is highly reverberant, an echo-effect will occur which can impair intelligence. For this situation, microphones are available with a cardioid, or uni-directional pickup pattern which tends to nullify reverberatory effects or the pickup of other unwanted extraneous sounds.

[1]Low-frequency roll off may be obtained by reducing the size of speech-amplifier coupling capacitors by a factor of from five to ten. High-frequency roll off is simply obtained by shunting the plate-load resistor of speech amplifier with a capacitor of from 500 to 3000 mmf.

Voice Control

A cardioid pattern also can be beneficial when voice-controlled operation is used in conjunction with a loud speaker, because the received signals reproduced by the speaker, which might otherwise be picked up by the microphone and thereby trip the vox circuits, will tend to be nullified. Also, accidental tripping of the vox circuits by other extraneous noises can be minimized. Less critical adjustment of the vox controls will be required and smoother operation may be obtained than experienced with most other microphones having only a semi-directional pattern.

Handling Convenience and Operating Conditions

The conditions under which operation is conducted are either fixed or mobile. For fixed use the microphone is generally mounted on a stand placed on the operating table, so weight, size and type of mounting usually are relatively unimportant, but for mobile work these factors should be considered. Most mobile operation is conducted with hand-held microphones, in which case light weight and small size is most comfortable. Crystal and ceramic units usually are lighter than dynamic ones, with weights for any one type varying between one and two pounds.

Mobile operation with a hand-held microphone can be dangerous. A much safer method is the use of a microphone which is mounted on the car or on one's person, so that hands may be left free for properly operating the vehicle. For this purpose a lavalier- or slim-jim type may be supported by a cord suspended from the operator's neck, or a lapel-type may be hung on the operator's coat. Another means is a head-set mounting; however, one can feel quite encumbered with such a device. Also, it does not readily permit the wearing of a hat, attracts undue attention and makes it easy for one to get tangled up in the microphone cord.

From the standpoint of convenience and safety, probably the best arrangement is to mount the microphone on the sun visor or on a bracket supported from a window frame or the dashboard with a means of minimizing vibration, if needed. This may require slightly more a.f. gain and it can result in extraneous noise pickup, thus limiting the use of v.o.x.; however, such operation need not be a necessary requisite. A foot-pedal switch can be used for push-to-talk operation.

Carbon microphones are often used for mobile work, mainly because one or two stages of speech amplification may then be eliminated. Except in cases where such simplification is an absolute necessity, a carbon unit is not recommended due to its high inherent distortion, an especially bad characteristic if s.s.b. use is involved.

Durability

An important consideration concerning a

microphone, especially for mobile work, is its ability to withstand rough usage and extremes in temperature and humidity. Dynamic microphones are unaffected by climatic conditions and are generally quite rugged. In some cases however mechanical shocks, such as those resulting from dropping, can cause a weakening of the magnet or misalignment of the moving element. Rough usage also can damage the diaphragm of this and other type units.

Crystal units are quite susceptible to damage by high temperatures and humidity. Many a microphone has been rendered inoperative when left in damp areas or in a car during hot weather. A good precaution with a crystal unit is to place a cover around it and remove it from the car when the latter is parked during adverse climatic conditions. Ceramic microphones withstand normal extremes and are a good bet when their lighter weight and smaller size might make them a choice over a dynamic unit.

Operating Suggestions

It might be well to suggest a few operating practices. It generally will be found best to speak into the microphone at a distance of 4 to 8 inches away from it. Closer working proximity will tend to accentuate the lows which may make the voice sound bassy or boomy, overshadowing the needed h.f. consonant sounds and thus reducing the useful talk power mentioned earlier. Talking close also may introduce annoying pops or air blasts produced by the explosive consonants (p, b, t, d, k and g) as well as other breathy sounds inherent with some voices; however, this may not always be the case, since some microphones are equipped with pop-proof grilles to minimize these effects.

On the other hand, working too far away may result in a high degree of interference from room reverberation or other extraneous noise, may cause a lack of presence and may require more a.f. gain than is available for a given operating level.

If the voice is quite breathy, produces whistle-like sounds (often cause by dentures) or is too predominant in the sibilant sounds (s, z, sh, zh, ch and j), working across the front of the microphone from a 45° to 90° angle, rather than directly into it, will minimize these effects, reducing the chances of sideband splatter.

A characteristic of the voice, particularly the male one, is that the amplitudes of the positive and negative peaks are usually unequal. Thus, when a transmitter is modulated, the r.f. envelope will be non-symmetrical. If the unbalance is greater on the negative side, the average power will decrease, but if the unbalance is greater on the positive side, the average power will increase and a more effective signal will be transmitted.

The advantage to be gained by a lopsided-voice characteristic may be ensured by correct polarization in the modulating system. This may be checked by observations made of the modulated r.f. output with an oscilloscope, or by aural on-the-air tests. To do this, switch around the connections of one winding on an a.f. transformer, used in the system, until the oscilloscope indicates the positive peaks to be greater than the negative ones, or if listening tests are used, until the signal sounds the loudest. If a phasing-type s.s.b. system is used, the connections to be switched around are those of the primary on the a.f. transformer which feeds the input to the a.f. phase-shift network.

A difficulty, often encountered, involves r.f. pickup by the microphone cable which results in audible feedback. Such r.f. pickup usually occurs when the cable is resonant at the transmitter frequency, either by itself or in conjunction with some other elements of the transmitting system. This type of trouble generally may be cured either by changing the length of the cable, or by installing a 10K resistor directly at the grid of the speech amplifier together with a 100 mmf bypass as shown in fig. 1.

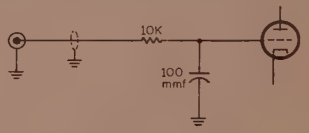


Fig. 1—Simple RC network placed at the grid of the microphone amplifier will reduce r.f. feedback.

In the case of a crystal microphone, r.f. energy on the cable also can be rectified by the crystal element itself and produce feedback, so if the aforementioned alterations do not provide a complete cure, it may be made further possible by the installation of a 100 mmf capacitor across the circuit directly at the microphone head. A ground connection, to the transmitter, made of at least one inch width copper strap often will also help cure feedback.

Available Microphones

A number of popular microphones are listed herewith. The characteristics as specified by the manufacturer are given, and in some cases the response characteristics, as checked by the author, are also given. Usually a manufacturer's stated frequency response over a given range covers the frequencies to which the microphone will respond, but such figures do not indicate the relative response compared to a given reference. In other words, the response may vary widely, including high peaks or deep valleys in an amount as great as 10 or more db, or it may be high at one end of the spectrum or peaked somewhere else in the range. Such specifications are meaningless, unless they are given in related values such as ± so many db, or unless the actual curve is furnished for a particular type unit. A "uniform" response is considered to be one which has a spread of ± 3 to 5 db.

The response curves, as found by the writer, agree quite closely with those furnished with several of the microphones tested, so from these it was possible to evaluate the character-

istics of the measuring system which was used, and thus reasonable accuracy was ensured when the other microphones were tested. Dynamic units were fed into an impedance of 100K, crystal units into 5 megohms. Listening tests were also conducted using low and high-pass filters for checking cut-off points. The indicated measurements give the range of the uniform response except for the variations noted.

Astatic Model 10-D

Dynamic type. Mfgr's Specs: esponse 300-3000 cycles ailored response for highe lk power on s.s.b. and a.m. leasured response: Low-fre- uency cutoff near 250 cycles id high frequency cut off ear 5500 cycles, with very ight rising characteristic. mateur net, $23.00; with grip -talk stand; $35.94.

Astatic Model 10-C

Ceramic type. Mfgr's Specs: Same as 10-D. Measured esponse: Approximately same cutoff points as Model 0-D, but rising characteristic 1000 to 2500 cycles with sharp peak at 3000 cycles. Amateur net, $18.00; with rip-to-talk stand, $35.94.

Astatic Model D-104

Crystal type. Mfgr's Specs: 30-7500 cycles with rising characteristic 500-4000 cycles. Measured response: 150-5000 cycles, rising above 1000 cycles with a sharp peak at 3000 cycles. This has been a popular unit for many years with a.m. operators. Not recommended, however, for s.s.b. Amateur net, $18.60; with grip-to-talk stand, $33.57.

Astatic Model 331

Ceramic type. Mfgr's Specs: 300-5000 cycles. Measured response: 350-6000 cycles. It's small compact tapering design permits its use as lavalier type with adapter which is available, thus making it suitable for mobile use. Has built-in momentary-on, spring-return switch. Amateur net, $10.74.

Electro-Voice Model 600-D

Dynamic type for mobile hand-held use. Mfgr's Specs: 100-7000 cycles. Measured response: 150-5000 cycles. Lightweight and very rugged. Equipped with push-to-talk button. Amateur net, $28.50.

Electro-Voice Model 664

Dynamic type with cardioid pattern. Mfgr's Specs: 40-15,000 cycles. Curve supplied indicates 60-15,000 cycles, plus or minus 2.5 db. Blast filter and pop-proof mesh grille provided to minimize wind and breath blasts. High discrimination against unwanted sounds from rear and sides. Tests indicated unwanted-noise-cancelling entrances to be very effective in the reduction of extraneous sounds, improving vox operation and minimizing adverse acoustic conditions. Amateur net, $51.00 with built-in slide switch.

Electro-Voice Model 729

Ceramic with cardioid pattern. Mfgr's Specs: 60-8000 cycles. Random noise, reverberation feedback reduced by a factor of 67%. Measured response: 150-5000 cycles, very smooth with slight rise above 500 cycles with cutoff above 5000 cycles. Tests also confirmed cardiod characteristics and advantages. This unit is slim and lightweight, making it easy to handle. Amateur net, $14.70 with stand; $15.90 with built-in switch.

Electro-Voice Model 951

Crystal type with cardioid pattern. Curve furnished indicates 60-11,000 cycles plus or minus 3 db. Measured response: Within tolerance, except peak at 4000 cycles in excess of peak indicated on curve. Very rugged and has pop-proof grille. Amateur net, $32.70 with built-in slide switch.

Shure Model 488A

Noise cancelling controlled reluctance unit (high impedance with switch) for hand-held close-talking use. Exceptionally high discrimination against unwanted extraneous sounds. Response not measured, but listening tests indicate a clean range of 200 to 4000 c.p.s. as specified by manufacturer.

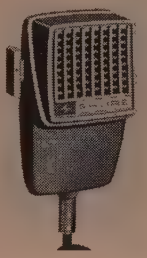
Shure Model 440-SL

Dynamic type. Mfgr's Specs: Especially suited for s.s.b. use. Rising response characteristic with sharp cutoff below 300 cycles and above 3000 cycles. Eliminates need for audio filters. Measured response: Low-frequency sharp cutoff a little under 300 cycles and high-frequency sharp cutoff just

above 3000 cycles, closely resembles a.f. band-pass filter. High output level. Very smooth sounding with good audio punch. Amateur net Model 440, $15.00; Model 440-SL with stand and grip-to-talk switch, $28.00. Also available with additional switch on stand providing choice of grip-to-talk or vox operation.

Shure Model 201

Ceramic mobile type for hand-held use. Mfgr's Specs: 200-4000 cycles. Measured response: 150-4500 cycles. Smartly styled and lightweight with high-impact "Armo-Dur" case. Has push-to-talk switch and coiled cord. Amateur net, $10.58. Controlled magnetic version (not tested), Model 401A, $12.94.

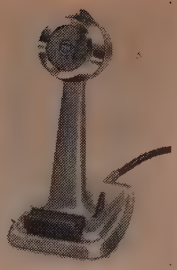


Shure Model 245 Uniplex

Ceramic uni-directional type. Mfgr's Specs: 50-7000 cycles. Furnished curve indicates 10 db rising characteristic from 200 to 1000 cycles, levelling off up to 6000 cycles; confirmed by measurements. Excellent cardioid pattern for elimination of unwanted sounds from rear and for use with vox systems. Lightweight and slim. May be used with lavalier mounting for mobile operation. Amateur Net, $21.00 less stand. Model 245S with built in switch, $22.20.

Shure Model 404C

Controlled magnetic type for hand-held mobile use. Mfgr's Specs: 200-8000 cycles. Measured response: Low-frequency cutoff below 250 cycles and high-frequency cutoff above 3500 cycles with rising response up to 1000 cycles. Very high output level. Lightweight, high-impact case with coiled cord and million-cycle switch. Amateur Net, $19.40.



Turner Model 254-C

Crystal type. Mfgr's Specs: 60-8000 cycles. Measured response: 150-8000 cycles, rising above 1000 cycles with sharp peak near 4000 cycles. Lightweight, easy to handle. Amateur net, $14.10; including stand and touch-bar-on-off switch.

Turner Model 350-C

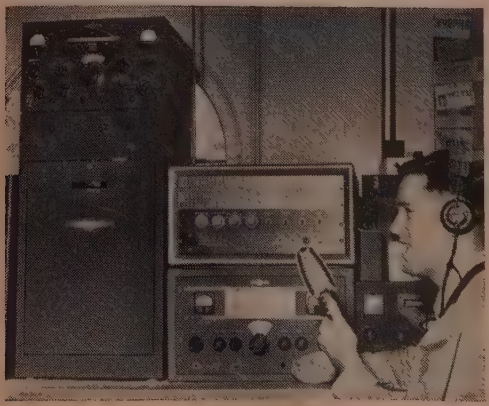
Ceramic mobile type. Mfgr's Specs: 80-7000 cycles. Lightweight for hand-held use. Not tested. Amateur net, $10.80.

University Model 70

Dynamic type. Omni-directional. Mfgr's Specs: 50-14000 cycles. Curve furnished indicates 100-12,000 cycles, plus or minus 2.5 db. Lightweight and slim, making it easy to handle. Amateur net price, $29.35.

Turner Model SR90R

Carbon mobile Type. Manufacturers specs: 200-4500 c.p.s. With Coil-Cord and dashboard mounting bracket. Handsome brushed chrome finish. Light weight for hand use. Not tested Amateur net, $15.95.



W2JIO TRAINS BLIND YOUNGSTERS IN ELECTRONICS

Under the able direction of Bob Gunderson, W2JIO, The New York Institute For The Education of the Blind is currently training many youngsters in the field of electronics. Dan, WA2HIY is just about to nab a rare one at the school station.

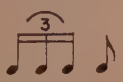
A New Approach To Learning The Code

BY FREDERICK E. WARTH, JR.*, K4TZN

We don't expect this system to revolutionize the teaching of Morse Code, but if you've got the patience to learn what 4/4 time is all about, you'll get a kick out of following the author's presentation and at the same time wonder why no one ever thought of it before.

HERE at the Amateur Radio Club of Savannah, we have, for sometime now, been carrying out a program of education in the field of radio theory and International Morse Code. As code instructor for one of these classes, I have evolved, what I believe to be, a new and effective approach towards getting this subject across to the student. Having found this system most satisfactory in my case, I felt the idea should be passed on to others who might be either teaching or trying to learn the code. The system is quite simple and I am surprised that it has not been used publicly before.

Let's face it! Code is a language of music, monotoned to be sure (under normal conditions) but the rhythm is there.

For example, the main musical figure that appears throughout the last movement of Beethoven's 5th Symphony is:

which is simply the letter V and, as many of you probably remember, this composition is referred to as the "Victory" Symphony. Another example is the familiar Dum-de-dum-dum

of the theme from the TV program *Drag Net*. Expressed another way, it comes out DA-DI-DA-DA, or simply the letter Y.

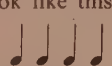
Having had a musical background, I was quick to see this relationship between code and music, thus, when undertaking the task of instructing Neophyte hams in the art of extracting intelligence from the cacophony of sounds found in the c.w. portions of our bands, I decided to translate the 'DITS' and 'DAS' into musical symbols. I also felt that the use of musical notes would help to stress the importance of proper rhythm when sending code. Naturally, not everyone has had training in music, but a surprisingly large majority have had *some* acquaintance with it and need only to be reminded of the mathematical value of musical notes.

So let's start with the quick little music lesson: The basic note in music is the quarter-note

which gets its name from the fact that in common time (or 4/4 time) there are four quarter-notes to a bar and each note stands for one beat. A beat lasts until the next note is struck. For instance: if you can imagine a gong being struck several times in succession you will notice that each time the gong is struck it continues to ring right up to the time it is struck again. An eighth-note,

has half the value of a quarter-note and it takes eight eighth-notes to make a bar in common time. The eighth-note is the up beat. As an example, when striking the imaginary gong, the eighth note would appear at the opposite end of the stroke. Using this symbol

to show where the accent falls, with quarter-notes it would look like this



and with eighth-notes, like this

with all notes being equally spaced in time. A sixteenth-note

has half the value of an eighth-note and it takes sixteen equally spaced to make a bar in common time.

when a dot

(•)

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appears after a note, it means that the note should be held one-half again as long as the original value of the note.

For example,

could also be written

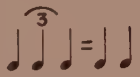
or

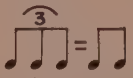
could be written

etc.

When the triplet symbol

appears over a group of three notes it means the three notes should be sounded equally spaced in the same time that two notes of that value would appear.

Thus:

in total time value and

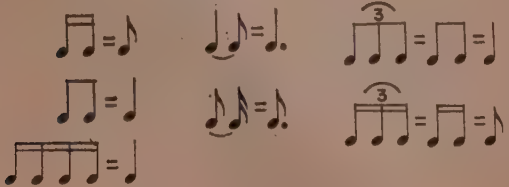


in total time value. A grace note is a note that is drawn smaller than the other notes and is attached in front of a note. It has the value of a thirty-second note, but its value is not recorded in the total value of a note. Example:

is equal to

in total time value. Actually, it should be written

but it is more clearly expressed when a grace note is employed. This is all the music you have to know for our purposes and to sum it all up, here it is in a nut shell.



One more thing; in order that we may reproduce these sounds,

will be pronounced DA and

will be pronounced DI (DIT when it appears at the end of a letter group).

In theory a DA is three times as long as a DI but in actual practice this seldom holds true. I have, therefore, tried to present the code as it is usually heard on the air when sent by a good operator. Now we are ready to learn the code, so here is the alphabet.

A	J	S
B	K	T
C	L	U
D	M	V
E	N	W
F	O	X
G	P	Y
H	Q	Z
I	R	

Another inovation that I am trying out at the present time is this. I have set up a slide projector in such a fashion that when a character is sent, the letter is shown on a screen a split second later; the idea being, when the student hears the code he will instantly "see" the letter in his mind. Since this is a new method at this writing, I have not had a chance to give it full evaluation. From all indications, it looks as though it will be a success. Nothing but favorable comments have been made in regard to this method and perhaps some of you may like to experiment with the idea.

Well, that's it! I hope some one will benefit from these ideas and I would welcome comments on the subject. ■

Understanding Transistors As Applied To Amateur Radio

BY LESTER A. EARNSHAW*, VE7QL

Many amateurs have difficulty understanding transistor operation, and, of course, transistor circuit design is a remote thought. The author presents a simplified approach to the understanding of transistor operation and some basic audio design techniques that, for use, require only the ability to multiply and divide.

A RATHER simple but effective way of understanding transistors is to compare them with vacuum tubes. This is permissable just so long as the comparison is not allowed to go too far.

The emitter of the transistor is roughly equivalent to the cathode of the tube. The base is equivalent to the grid and the collector to the plate. In order that the similarities of circuit connection may be noted, both a transistor and a tube amplifier are shown in fig. 1. The major difference between the two circuits, in this instance, is that of bias. Whereas the tube requires a *negative* fixed bias at the grid, the n.p.n. transistor requires a *positive* bias at the base. But in both cases, a positive increase in bias, as occasioned by a signal, will cause an increase of collector or plate currents.

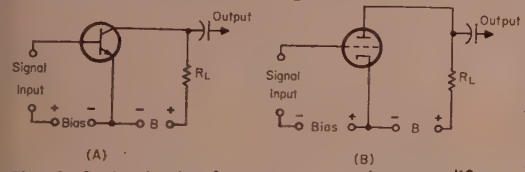


Fig. 1—Basic circuit of an n.p.n. transistor amplifier (A) compared with a vacuum tube circuit (B). The arrow shows the direction of hole flow in the transistor.

The transistor shown in fig. 1 is an n.p.n. as is indicated by the direction of the arrowhead on the emitter lead. The p.n.p. transistor is designated as shown in fig. 2.

The arrowhead indicates the direction of *hole* flow. (If this is confusing just remember that hole flow is in a direction opposite from the electron flow.) A p.n.p. transistor connected into the circuit of fig. 1A would have the bias and supply voltage polarities reversed. This is shown in fig. 2. Having transistors available which will operate either from a negative or a positive supply voltage is a convenience not to be obtained from tubes. Combinations of p.n.p. and n.p.n. transistors can lead to a considerable saving in circuit complexity and equipment cost.

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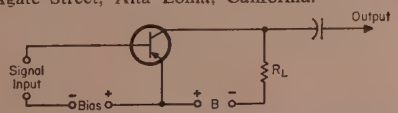

Fig. 2—Basic circuit of a p.n.p. transistor amplifier. Note the direction of the arrow and the polarities of the applied voltages as compared with the circuit in fig. 1.

Input Impedance

A tube requires a change in grid *voltage* to effect a change in plate current. A transistor requires a change in base *current* to effect a change in collector current. The fact that current flows in the base of the transistor indicates that the impedance of the base circuit is low. In practical cases the transistor input impedance will range between 300 and 3000 ohms for i.f. and low power audio stages. High power audio transistors may have base impedances of only a few ohms.

Temperature Stability

Transistors are considerably more temperature conscious than tubes. There are certain technical obligations which must be fulfilled before the transistor is able to operate over a wide temperature range. In the first instance, a transistor can never normally be completely cutoff. There will always be a small leakage current, I_{co}, between the collector and the base. The value of this current will increase with a rising junction temperature.

In the circuit of fig. 3, the I_{co} arriving at the base, from the collector, having no alternative path back to the battery, will flow through the transistor from base to emitter. Whether the base current is supplied from an external or internal source is of little consequence to the base. The transistor "sees" the current as an applied bias. Thus, the emitter current will rise to a new value. If however, a jumper wire is connected cross the terminals

Fig. 3—The leakage current I_{co}, will flow from collector to base and through the base emitter junction to the emitter in this circuit unless an alternate path is provided across terminals A-B as explained in the text.

A, B, in fig. 3, the I_{co} current will take the new lower resistance path provided, in preference to crossing the base emitter junction. Consequently, an increase in temperature will cause only a slight increase in I_{co} current and not an additional amplified current flow.

Unfortunately, a jumper wire connected across the terminals A,B, in fig. 3, will offer a direct short to the input signal and except in circumstances shortly to be outlined, a compromise must be found.

If an input signal current is applied to the base—emitter circuit, the full power input will be realized. However, I_{co}, flowing from the base to the emitter, will lead to increased collector current.

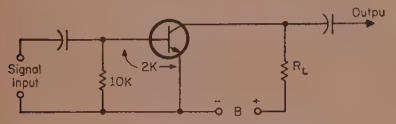

Fig. 4—Simple circuit showing the addition of the base-emitter resistor, in this instance, 10K. The transistor input impedance is 2K. The fixed bias is omitted for the sake of clarity.

In fig. 4 the base is connected to the emitter through a 10K resistor. If the transistor input impedance is 2000 ohms, 1/5th of the input signal current will be lost through the 10K resistor and 4/5ths will flow in transistor base emitter circuit. Obviously, from this point of view, it would seem that the external base-to-emitter resistor should be as large as possible. On the other hand a high base-to-emitter resistance value does not decrease the I_{co} current from base to emitter and will lead to increased collector current with rising temperature. Obviously a compromise must be made here.

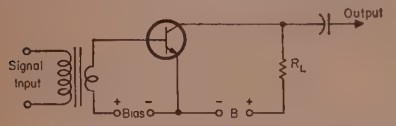

Fig. 5—A transformer coupled input circuit keeps the external base to emitter resistance low.

When the amplifier is transformer coupled from the driving source, it is then a simple matter to obtain a low external resistance between the base and the emitter. Referring to fig. 5, it will be seen that bias is inserted in series with the transformer secondary without substantially increasing the base to emitter resistance.

A summation of the preceding remarks indicates that when a transistor is subjected to changing temperatures it is highly important that the external base to emitter resistance be low in value. This is the first rule in temperature stabilization of a transistor.

The Emitter Resistor

A further aid to temperature stabilization is

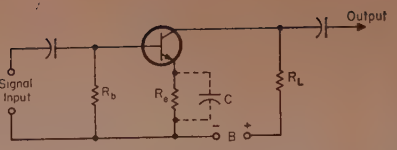

Fig. 6—The inclusion of the emitter resistor R_e aids in the temperature stabilization of the transistor Capacitor C reduces degeneration.

the emitter resistor. This is shown in fig. 6. Resistor R_e will normally have a value sufficient to cause a voltage drop of from 1/5th to 1/12th of the supply voltage. The action of the resistor is similar to that of the cathode resistor in the tube circuit. As the bias at the base is caused to increase, the voltage across R_e rises, causing the difference between the base and emitter potentials to fall. The reduced bias will cause an appropriate decrease in collector current. In a practical circuit, R_e is bypassed with a capacitor, C, to prevent degeneration of the signal itself.

When designing transistor amplifiers it is generally satisfactory if R_b has a value of from 5 to 10 times the value of R_e.

The second rule of stabilization is that the emitter resistor R_e should be as large in value as possible. But it should be borne in mind that a large resistor in this position will cause a large voltage drop and thus subtract from the voltage available at the collector. Compromise values are generally found according to the particular situation.

Transistor Bias

In order to operate properly, the transistors in figs. 3, 4, 5 and 6 must be supplied with a source of fixed bias. In fig. 7, bias is supplied via resistor R_{bias}. The value of this resistor is chosen to provide the proper base current. The calculation is simple ohms law. For example, assume a supply voltage of 6 volts and a required base bias of 50 μa. From ohms law then:

$$R_{bias} = \frac{6}{.00005} = 120K \qquad (1)$$

However, because the resistance between the base and emitter is very high with this arrangement, the temperature stability of the circuit will be poor indeed. Only very slight changes in ambient temperature or replacement of the transistor (even of the same type number) will cause large changes in collector current. Thus,

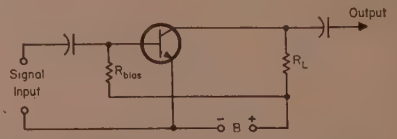

Fig. 7—A simple biasing arrangement where the resistor R bias is chosen to provide the correct bias current. This circuit has drawbacks, as explained in the text, and should be avoided.

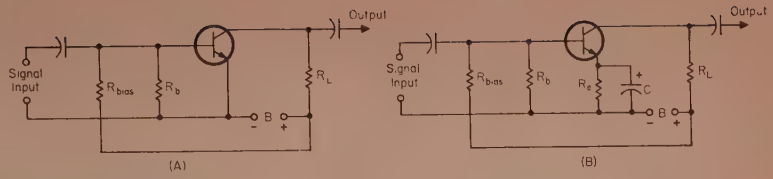

Fig. 8 — Two preferred methods of biasing a transistor Circuit (B) which includes the emitter resistor Re, is the best approach.

although this means of biasing is quite common in amateur literature, it should be left strictly alone.

By combining the bias arrangement of fig. 7 with the circuits of figures 4 and 6, both bias and temperature stabilization is obtained at the same time. The new circuits are shown in figs. 8A and B. Figure 8B must be considered vastly superior to A. It is not coincidental that almost all commercial and military equipment use bias configurations based on fig. 8B.

Designing and Building an Audio Amplifier

To properly design an audio amplifier it is necessary to have access to published curves of the transistor's characteristics. However, quite satisfactory design may be achieved, sufficient for amateur purposes, without this approach. This simpler procedure is outlined below.

Assume a 12 volt supply voltage and take advantage of the fact that most low level transistors have a maximum power gain in the region of 1 ma collector current. Allow for a voltage drop of 1/12th of the supply voltage across R_e. (This was discussed earlier.) One twelfth of the supply voltage is 1 volt. One volt, divided by 1 ma of emitter current equals 1,000 ohms. Therefore, $R_e = 1{,}000$ ohms.

Of the remaining 11 volts choose a value of R_L which will drop half this voltage:

$$R_L = \frac{5.5 \text{ volts}}{1 \text{ } ma} = 5.5K \qquad (2)$$

It will be seen that with this value of collector load resistor the collector voltage will be able to rise or fall an equal amount in either direction. Thus the transistor has been biased at the midpoint of the I_b-I_c curve.

The I_b-I_c curve is the transistor equivalent of the tube E_g-I_p curve. However, whereas the tube curve shows the input grid *voltage* plotted against the output plate current, the transistor curve shows the input base *current* plotted against the output collector current.

Allowing resistor R_b to be 10 times the value of R_e gives R_b a value of 10,000 ohms.

Resistor R_{bias} may now be chosen so that the voltage at the base of the transistor will cause the correct base current to flow. This is simply established by adjusting R_{bias} until 1 volt is measured across R_e or 5.5 volts is dropped across R_L. Alternatively, the transistor may be ignored or removed from the socket and the value of R_{bias} calculated to create a voltage of 1.2 volts at point A in fig. 9.

$$C = \frac{10{,}000 \times 12}{1.2} = 100K \qquad (3)$$

The above calculations have conveniently ignored several factors. First, by removing the transistor from the socket we have taken for granted that the transistor does not draw current or load the circuit when this is not the case. Second, a bias voltage of 0.2 volts was assumed. Third, no mention was made of the transistor gain. In spite of the above omissions it will be found that the transistor is operating close to the expected figures. This is primarily due to the self adjusting property of resistor R_e.

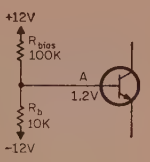

Fig. 9—Basic circuit used to compute the correct value of R bias. This approach is an over simplification that still works out very close to the correct figures. In general it may be used without reservations.

Another method of adjusting the value of R_{bias} has considerable merit. It is outlined below.

From the transistor data find the forward current transfer ratio, H_{fe}. A typical figure might be 60. (This is simply the current gain of the transistor.) To find the base current, divide the collector current by H_{fe}. In our example, 1 ma divided by 60 equals 17 μa. Now, empirically, adjust R_{bias} until the base current reads 17 μa.

When it was assumed earlier that the base current would have small effect upon the voltage divider of fig. 9, we were not far from the truth. The current drawn by the divider is so much greater than that drawn by the base, (17 μa in this case) that the effect upon the voltage at point A is small.

The Practical Amplifier

The amplifier shown in fig. 10 is based on data obtained from the preceding paragraphs. Input impedance is dependent upon transistor type, but in any case, will be in the vicinity of 1500 ohms. Such an impedance makes the amplifier suitable for use with a dynamic microphone. Alternatively, the amplifier may follow a receiver.

Because transistors are low impedance de-

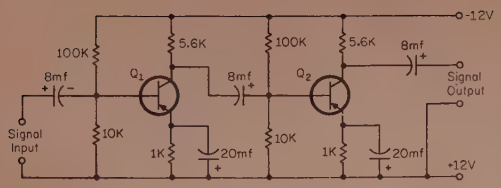

Fig. 10—A practical two stage audio amplifier circuit based on the data presented in the text. Transistors Q1 and Q2 may be types 2N408, 2N140 or 2N1274.

Because transistors are low impedance devices, considerable latitude in layout is possible. Transistors and components may conveniently be grouped together on a non metallic chassis. Components may be of small size as the voltages are low and insulation may be of minimum requirements.

The Emitter Follower

If a high input impedance and low output impedance is required of a transistor this may be obtained from the emitter follower circuit. The emitter follower is the transistor equivalent of the cathode follower and in many respects behavior of the two circuits is identical.

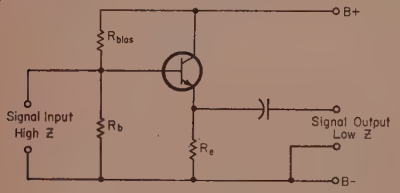

Fig. 11—Basic circuit of the emitter follower which, in many respects, is the same as its vacuum tube counterpart, the cathode follower.

The schematic of an emitter follower is shown in fig. 11. The input impedance is equal to the current gain (H_{fe}) of the transistor, in common emitter connection, plus 1, times the resistance in the emitter circuit. For example, if R_e is 2,000 ohms and the current gain of the transistor is 60, the input impedance equals 60 +1 × 2,000, or 122,000 ohms. Obviously, the higher the emitter resistor, R_e, the higher the input impedance of the stage. The effective resistance in the emitter circuit must include the load which is shunted across R_e. The latter is an important consideration which is frequently overlooked.

In fig. 12, an emitter follower has been used to match a ceramic microphone to the amplifier of fig. 10. Assuming an external load resistance of 2,000 ohms the input resistance may be calculated as follows:
Find actual R_e.

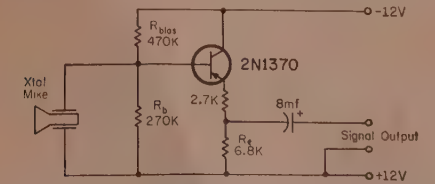

Fig. 12—A practical emitter-follower that can be used to match a high impedance ceramic microphone to the low input impedance of the circuit shown in fig. 10. The 2N1370 shown has an H_{fe} of 80.

$$R_e = \frac{6800 \times 2000}{6800 + 2000} + 2700 = 4{,}245 \text{ ohms} \quad (4)$$

The figure of 343,845 ohms will be reduced somewhat by the presence of the biasing resistors R_b and R_{bias}. The bias resistor values shown in fig. 12 will allow stable operation over a reasonable range of operating temperatures. Transistors used in this position should be chosen for their low I_{co}.

Higher Power Amplifiers

The design of the higher power class A amplifier differs only little from the preceding design procedures. In this instance, the impedance of the load is determined by the required output power. Only the very minimum voltage should be dropped across the emitter resistor R_e. A satisfactory figure when operating from a 12 volt supply is .5 volt. This will allow 11.5 volts collector supply (V_{ce}).

The transformer primary impedance may be calculated:

$$Z_{in} = (\text{Gain} + 1)\, R_e$$
$$= (80 + 1)\, 4{,}245 = 343{,}845 \text{ ohms} \quad (5)$$

where P_o equals the required power output. Assuming that a power output of 3 watts is required the calculation becomes:

$$R_L = \frac{V_{ce}^2}{2P_o} \quad (6)$$

$$R_L = \frac{11.5^2}{2 \times 3} = \frac{132}{6} = 22 \text{ ohms}$$

The current, I_c, drawn by the collector is calculated:

$$I_c = \frac{P_o \times 2}{V_{ce}} = \frac{3 \times 2}{11.5} \simeq .5 \text{ amps} \quad (7)$$

Resistor R_e may now be calculated:

$$R_e = \frac{E}{I_e} = \frac{.5}{.5} = 1 \text{ ohm} \quad (8)$$

For all practical purposes the emitter current, I_e and the collector current, I_c, are the same. From the earlier information,

$$R_b = R_e \times 10 \therefore R_b = 1 \times 10 = 10 \text{ ohms} \quad (9)$$

R_{bias} may now be calculated:

$$R_{bias} \simeq \frac{R_b \times 12 \text{ volts}}{E_{base}}$$

$$= \frac{10 \times 12}{.7} \simeq 170 \text{ ohms} \quad (10)$$

The figure, 0.7 for E_{base} consists of the voltage dropped across the emitter resistor R_e,

and the 0.2 volts bias which is an average value and sufficient for our approximate calculation. Note that if a silicon transistor is used, the average bias value should be increased to approximately 0.6 volts. The voltage dropped across the emitter resistor will remain at 0.5 volts. It is pointed out that resistor R_{bias} is approximate only and in the case of the high power amplifier the value should be adjusted until the emitter current reads the required figure, in this instance, .5 amps.

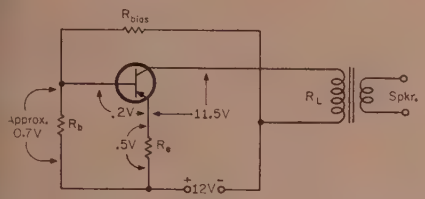

Fig. 13—A basic power amplifier showing the voltage distribution and data necessary for calculating practical component values.

The transistor may be chosen from the vast number available on the strength of the required dissipation. Collector dissipation is equal to $I_c \times V_c$. Dissipation = .5 amps × 11.5 volts = 5.7 watts. Thus any transistor capable of absorbing 5.7 watts and designed for this type of service is suitable. Examples are the RCA 2N301, Bendix 2N234A, the Texas Instruments 2N250 and numerous others.

Heat Sinking

Most power transistors are designed to be bolted down to the chassis or provided with an efficient heat sink. This is a very important matter and in the author's experience, often overlooked. The heat sink must have adequate area, preferably of a nature which allows efficient heat radiation.

A 3 Watt Amplifier

The schematic of fig. 14 shows a 3 watt amplifier using a Texas Instrument 2N250 and driven by a Texas Instrument 2N1381. The amplifier may be driven by the output from a receiver detector, a carbon microphone, or preceded by a preamplifier similar to that of fig. 10. The output transformer may either drive a speaker or modulate a 6 watt r.f. amplifier.

The design of the amplifier was accomplished by the methods discussed earlier. The required driving power was calculated in the following manner:

$$\text{Required drive power} = \frac{\text{Power out}}{\text{gain}} \qquad (11)$$

If the gain figure is unknown the figure 20 db may be used. This will then allow for the worst possible spread in transistors and for many different types. (Note that 20 db equals a gain of 100)

$$\text{Drive power} = \frac{3 \text{ watts}}{100} = 30 \text{ mw.}$$

Allow 75% transformer efficiency.

$$\text{Drive power} = \frac{30}{.75} = 40 \text{ mw}$$

The only other point not discussed in the preceding pages concerns the transformer (T_1)-to-2N250 impedance match. Generally, in communications work, it is satisfactory if the transformer is matched to the transistor input impedance, a figure which is supplied by the manufacturer. This figure is listed under h_{ie} or sometimes as Z_{ie}. For the 2N250 the figure is quoted as 20 ohms. A transformer with a secondary impedance close to this will give maximum power gain.

The Class B Amplifier/Modulator

In mobile operated rigs, transistor modulators reign supreme. Modulators capable of supplying 100 watts or more of audio are readily constructed and are relatively inexpensive to build.

Design procedure is similar to that given in the preceding pages. Points of difference however, are noted below: To calculate the transformer primary resistance, R_L, proceed as follows:

$$R_{L,\ \text{coll. to coll.}} = \frac{2(V_{ce})^2}{P_o} \qquad (12)$$

Example: A class B modulator is required to deliver 20 watts (not including transformer losses). The supply voltage is 12 volts.

$$R_{L,\ \text{c-c}} = \frac{2(12)^2}{20} = 14.4 \text{ ohms}$$

To avoid tedious calculations a load resistance versus power output nomograph is shown in fig. 15.

Input Impedance—The input impedance of a class B modulator varies with signal level. A

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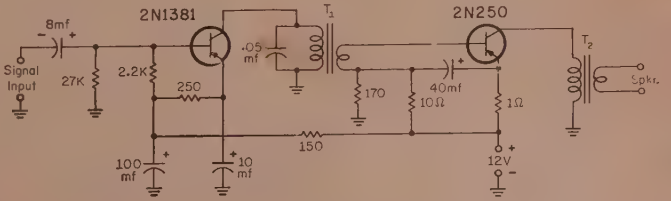

Fig. 14—Circuit of a practical driver and power amplifier designed from the data supplied in the text.

A Hybrid Clipper–Squelch

ALAN A. BORDEN*, W1OWD

If you're going mobile and need an effective noise clipper and squelch that requires no high voltage, this single tube device is for you.

One of the major problems confronting the average amateur who goes mobile is the elimination of noise peaks. Many circuits have been devised for peak noise clipping, others for squelch (muting). Actually, the fundamental operation of both circuits are similar. Here is a novel, yet simple circuit, that incorporates the functions of peak noise clipping and squelch action into a single multi-element tube.

It would be best to give you some idea of the advantages and disadvantages of the circuit since it is designed for cars that are equipped with a 12 volt system and receivers of either the hybrid tube variety (transistor output stages) or vibrator power supply types. One of the desirable features of the circuit is that only under a few scattered circumstances must you revamp any portion of the existing receiver. It may be necessary to bridge a resistor or two but nothing has to be cut out.

The squelch/clipper uses a multi-element hybrid tube enabling the use of the primary supply, the 12 volt battery. The circuit has been designed and the parameters selected so that little distortion is introduced into the audio with the connection of the squelch/clipper. The squelch level setting can be changed at will without affecting the audio.

The circuit does have limitations. These are comparitively few considering the overall worth and performance of the unit. The disadvantages are two-fold. First, the circuit cannot be used with the all-transistor type receivers since the impedances in the receiver are so low that the shunt effect of the squelch is ineffective. Secondly, this circuit cannot be used with receivers that incorporate a positive ground on the A line.

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Circuit Operation

The circuit is shown in fig. 1. The operation is predicated on the following: The 1N648 is always forward biased and shorts out the negative audio half cycles and noise peaks. The diode section of the 12DL8 kills the positive half of the audio cycles producing the squelch action. When the 12DL8 diodes are biased by the triode section of the tube, audio appears and positive noise peaks are clipped by the 12DL8 diodes.

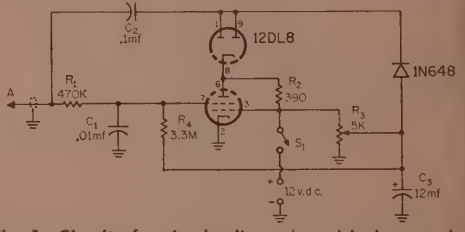

Fig. 1—Circuit of a simple clipper/squelch that can be added to most automobile receivers.

The operation of the 12DL8 is as follows: The rectified carrier and audio from the receiver are fed to point A of fig. 1. This passes through the decoupling network, R_1-C_1, which removes the audio component but allows the d.c. to pass and appear at the control grid. Capacitor C_2 passes the audio signal to the diodes but blocks the d.c.

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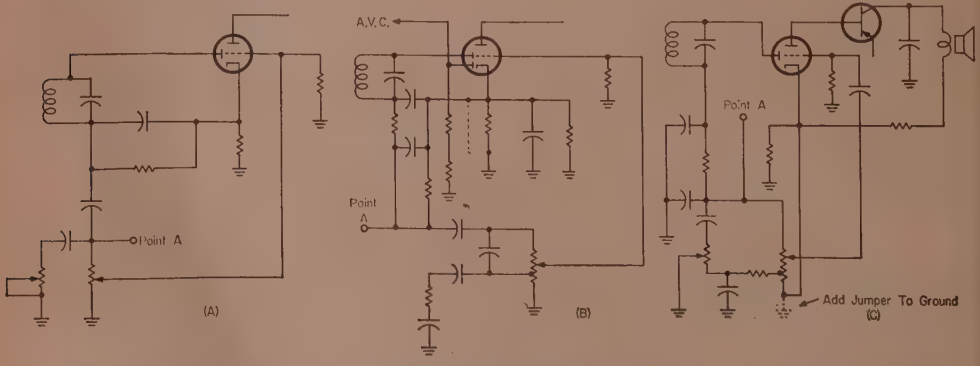


Fig. 2—Three typical second detector circuits and the connection point, A, for hookup of the clipper/squelch unit.

HOMER AND THE HAMS

BY W. V. MULL*, W3MFA

ar Luke:

I aint wrote to you for some time stly because things has been out normally lousy and not too h has happened. Not, that is, il the past couple of hours. ice then, Luke, you'd never be- eve all that has gone on.

You know how things get during e winter, Luke. Most of the ores is done early and time be- is to hang kind of heavy on your nds. I was getting to the point ere I was pulling for the guys in e black hats in the TV westerns, I started looking for something fferent to do. I recollected ading somewheres about these w.l. guys (thems fellows who set ound and listen to short wave dio, Luke) and I kind of figured at maybe it would be a good way while away a few hours.

Well, when I told that sweet lit- e crown of thorns I'm married to at I was going to be a s.w.l. she id that if that meant Sittin', ttlin', and Lookin' then it was- nothing new, that I had been ing that with TV for a long time. rthermore, she went on, like she ways does, that if I was in need something to do that she could ink of several things that could and a little attention. You know w un-reasonable women can be, ke, when they set their mind to . Like the time once when she got to promise to paint the front om if she would wash the walls wn. I got sort of tied up with ner things and didn't get around it for six months or so and no tter how patiently I explained she would not believe that I was st waiting for the walls to dry thoroughly.

Luke, you remember that old radio you traded me for that book that showed how to cheat successfully at cards? Well, I dug it out from under the coal pile, plugged it in, give it a couple of kicks and darned if it didn't come on. I begun tinkering with the dial and the first thing you know I begun hearing guys talking every lingo known to man. I guess it made sense to somebody, but it sure didn't mean nothing to me. Then I seen a little piece of the dial labeled, "Amateur Band." Now, Luke, if there's one thing this world got plenty of it's amateurs, and that goes for almost any field you'd care to mention, but I sure didn't know that they was advertising it. Anyhow, of all the things I didn't need an amateur band just about led the list. As you know I'm tone deaf and even professional bands don't send me much. But, I didn't figure to lose anything by listening so I tuned in.

Believe me, Luke, I never had such a nerve shattering experience. To begin with, there wasn't no music on there at all, and for awhile I couldn't make head nor tail of what all the noise was about. Then it dawned on me. It was a bunch of drunken hunters, Luke, and they was carrying on something awful. If Uncle Sam had any idea of what was going on there right over the air he would call out the militia. One guy would start hollering about bottles, and capacity, and resistance for a while and then another would begin bawling about dog biscuits and home brew. It was pretty obvious that most of them had plenty of capacity and darned little resistance. And did you

* 4 Shamrock Drive, Allison Park, Pa.

ever hear of measuring anything as being forty dog biscuits over ess nine, whatever that is? I'm dumb, Lukey, but even I know enough to use a ruler for measuring anything that needs to be measured.

That talk about home brew reminded me that I had a little of the last batch that you and me brewed up before the Feds caught you with two fake gas tanks on your car. I looked around and found the mason jar that it was in and took a little nip to calm my nerves. It aint changed any with age, Luke. When you drink it, it still feels like somebody had backed up with a wagon load of potatoes and dumped them right square on your head.

I listened for a little bit more, but when one of them hunters started talking about a dog x-ray it was almost more than I could stand. With all the people in the world in poor health them fools are squandering good money to get their dogs x-rayed. Oh, I'll tell you, Luke, they are a spooky bunch. One was talking about something that must be a disease that I never heard of. He called it the Frank Charlie Charlies, but he sounded more like the D.T.s was setting in.

And another thing that they was doing, Luke, that was downright ornery was that they was leading little kids astray. Why I heard little shavers that couldn't have been more than 13 or 14 talking just as brazen about building home brew rigs and all these older guys was egging them on. Now I reckon you and me could show any of them a thing or two about building home brew rigs, Luke, but nobody can ever say that we showed any little kids how to do it. I don't care what anyone says, at least we got principles. Then, too, they was all swearing something terrible. Yes they was! They was calling each other ssb'ers, and old brass pounders and who knows what all. What with things like that going on it aint any wonder that the country is going to pot.

Well, by this time I thought I had heard just about everythin but the worst was still to come I was listening to this one guy ya ping away when I heard some of th little noises like you hear in t movies when the ship is sinking a the radio man is trying to get som body to hear him so's he can te them about it. (They got them li tle pump handles, you know, a they bang them up and down a that's when you hear them litt peep, peep sounds like there w mice in the attic.) Well, this g I was listening to, he heard too. He had a terrible soundi voice, Luke, like Donald Duck. guess it's no wonder though wh with all that home brew he'd be swilling. Anyway, he stopped tal ing and listened for a bit and wh the little peeps stopped he star ed talking again, and it was pla as day that he knew what all th sounds meant. Luke, them guys w passing secret messages and I gue I've seen enough spy pictures know a secret message when I he one.

That did it! I come upstairs so could write and warn you about wh is going on and to tell you to ke a sharp look out in case any of th have infiltrated your cell bloc Soon as I finish this I'm going do to the court house and tell t sheriff about this bunch of su versive hunters. I'm one hundr per cent American, Luke, a darned if I'll stand idly by whi they undermine the country leading the youth astray. If the aint already a law against su carryings on I'm going to write congressman soon as I can find o who he is. Soon as I know anythi more I'll write to you again.

Sincerely,
Your Old Friend

Homer

DX DX DX DX DX

URBAN LE JEUNE, JR.*, W2DEC

The following certificates were issued during the period from October 6th to and including November 5th, 1962.

CW-PHONE WAZ

1739	W7UVR	Leander J. Smith
1740	PAØHG	W. Van Heeren
1741	G8VW	R. H. Newland
1742	DJ2VK	Philipp Angst
1743	W6VUW	B. W. Wyatt, Jr.
1744	W8DX	Richard J. Cotton
1745	UB5FJ	Anatoly Tselikov
1746	UA9DT	Vadim V. Kozlov
1747	UA3CA	Vlad
1748	UA3CT	Konstantin E. Sepp
1749	K8CVQ	Steve Solo
1750	JA1GV	Hideo Kishi
1751	DL9RK	Rutger Weber

ALL-PHONE WAZ

176	W6VUW	B. W. Wyatt, Jr.
177	G8AIZ	Charles C. Olley
178	KG6AJB	R. A. McLaughlin
179	W6NGA	R. J. Grill
180	W7CMO	Norman S. Moberg
181	GI3CDF	Leslie M. Lyske
182	W4AZD	Porter B. Orr
183	W4JGO	Glen W. Richie

TWO-WAY SSB WAZ

132	W6VUW	B. W. Wyatt, Jr.
133	G3AIZ	Charles C. Olley
134	W6YMV	Paul E. Friebertshauser
135	KG6AJB	R. A. McLaughlin
136	DJ3CP	Dieter Greve
137	DL3IR	Renato Belfi

CW WPX

379	UA9VB	Victor Priahin
380	UA3HK	Gen
381	UT5CC	Anotoly Gortikov
382	OK3EE	Peter Stahl
383	K8ITH	Alan Day
384	W2CUE	Alexander P. Marion
385	CE3AG	Luis M. Desmaras
386	K2ZCD	David W. Stewart
387	PY4AYO	Waldir Perreira Drummond
388	K2UPD	Peter Kragh
389	K4HPR	Jerome A. Fiore
390	K9WTS	Gunnar F. Ohlson
391	W2AIW	Charles W. Rogers
392	SP9TA	George Sulikowski
393	W6DLY	Guy M. Martin, Jr.
394	W1WHQ	W. Stanley Lamb
395	W7HDL	H. D. Huston

PHONE WPX

80	DJ2UU	Hansgeorg Baehr

SSB WPX

119	G3AWZ	George Pearson
120	W5DVV	Shirley Freeman
121	DL4FX	Capt. Vernon E. Foutz

MIXED WPX

47	G3NUG	E. N. Cheadle
48	K8ONV	S. Mary Ryden
49	GI8CDF	Leslie M. Lyske
50	W9FVU	William J. Gago
51	W9YT	Badger A. R. S.
52	GI6TK	Frank A. Robb

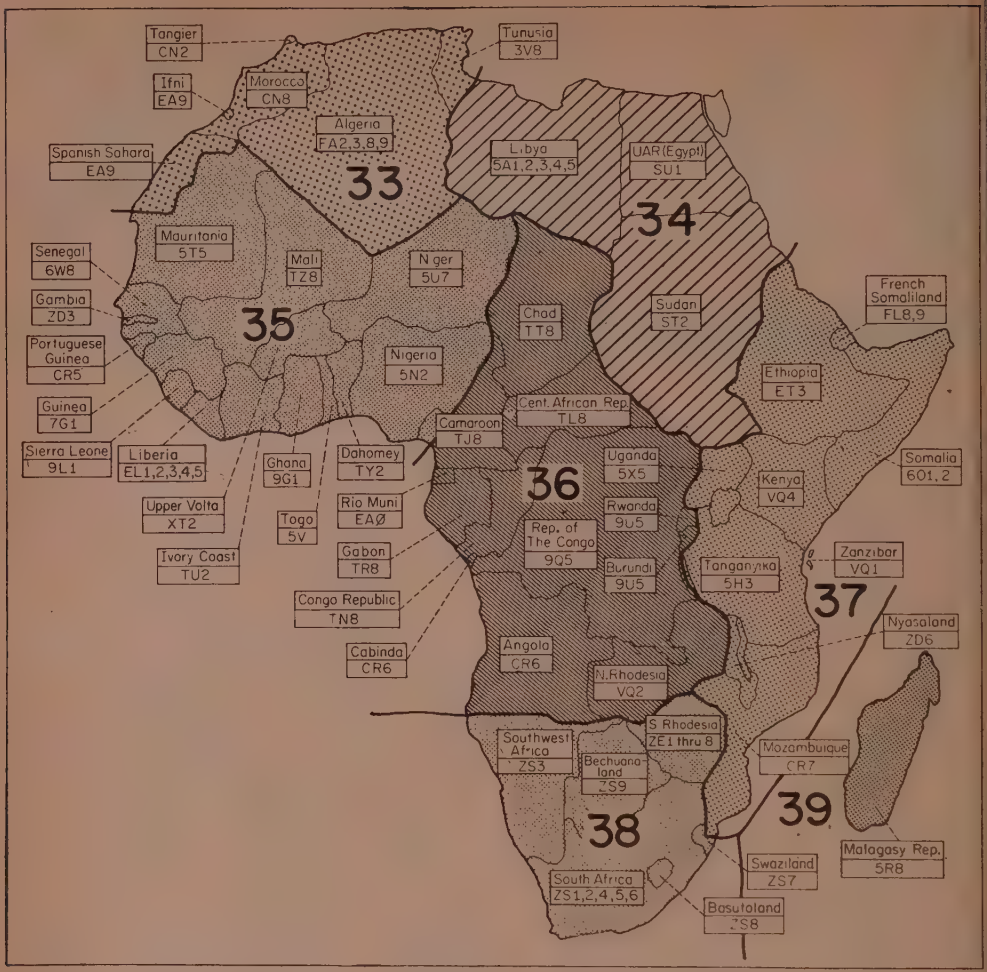
WPX ENDORSEMENTS

	Mode	*Continent*	*Band*
W1WLM	CW	E	
K2CPR	CW	E	
W3AYD	CW	E	14
	Phone		14-28
	Mixed	E	
W5WZQ	CW	E	7-14
K6EIV	CW		14
W9UZS	CW	E	
W9YT	Mixed	E	14
DJ2UU	Phone	E	
DJ3OJ	Phone	E	
DJ4HR	CW	E	
DJ4OP	CW	E	
DL1QT	CW	E	14
DL3RK	CW		14
DL9KP	CW		14
G2GM	CW	E	
G3DO	Phone	A	
G5GH	CW	E	
GI3CDF	Mixed	E	
	Phone	E	
JA2JW	CW	E	
PAØSNG	Phone	E	21
PY4AYO	CW	E	
ST2AR	CW	E	14
UT5CC	CW	E	
YU1AG	CW	A	
	Phone	E	

A-Asia; *E*-Europe; *F*-Africa; *N*-North America; *O*-Oceania; *S*-South America.

With this issue, we are starting a brand new year of DX activity. At this point, a review of last year's DX might give us a sign of things to come. 1962 brought the expected down-turn in propagation conditions and conditions were generally poor throughout the year; however, a rash of DXpeditions made it a very interesting year and a year in which more countries were added to totals than in many years of good propagation conditions. 1962 brought forth DXpeditions to such hallowed ground as AC5, FW8, and CR8 (CR1Ø). 1962 also brought forth two of the most ambitious DXpeditions of all time. It will be a long time before the exploits of WØMLY and W4BPD will be forgotten. Some of the highlights of 1962 are:

*Box 35, Hazlet, New Jersey.



With the new African nations quickly gaining independence some of the prefixes may be a little hard to follow. This map gives you an idea of what's current and the Zones may be of interest too.

WØMLY's operation as WØMLY/TJ8/TL8/-TN8/TR8/TT8/TZ2/TY2MY and 5V4MY. W4BPD's operation as VQ9AA/VQ9A/VQ9A/-8C/9U5ZZ/9U5BH and ZD9AM. Others were: FW8BH, VU2US/AC5, CR8AB and CR8AC, KS4BF/HKØAB, VR3L/VR1, YVØAA, XE1CV/XF4, XT2Z, FO8AN/ZK1BY, and the s.s.b. DXpedition by Leo, UA3CR, to UA1KED in Franz-Josef Land and UAØKAR on Dixon Island for Zone 18 credit.

Two of the most choice fixed stations were ZL4JF and TU2AL. The prize for the hoax of the year goes to ZA1GB, and to his QSL Manager W2FZY, our condolences.

Speaking of QSL Managers, we would like to tip our hat to the following QSL Managers for jobs which they handled with great facility. W3AYD, W4DQS, KV4AA, W8EWS, W4ECI and the QSL Manager's W2CTN.

What does 1963 hold in store for us. A few DXpeditions are already on the horizon and before the month of January is over, VKØVK will have been activated on Heard Island. Also scheduled for this year is the Willis Island operation of VK4WE. Gus, W4BPD, is continuing his mammoth DXpedition and he may set the DX world on its ear if his proposed trip to AC3 and AC5 materializes.

All in all, in spite of continued decreasing sunspot activity, 1963 should be another promising year for DX activities. CU in the pileups.

The Rig Goes Round

The following short story by Leo, UA3CR, originally appeared in the RSGB *Bulletin* and is repeated because of its great interest. Leo, as you will remember, obtained WAZ for 2×SSB certificate #1.

"This is the story of a roving s.s.b. transmitter which travelled 20,000 miles last year, and in the hands of a number of operators made a total of 6,500 contacts from the rarest spots in the U.S.S.R.

"The story of this travelling transmitter commenced a couple of years ago when sideband operating was a novelty and was not then accepted by most operators. A few s.s.b. enthusiasts were concerned with the problem of how to popularize this new mode of operating and how to boost their number. This was the subject under discussion at a round-table late in August, 1960 and which included UR2AR, UA3CR, UL7JA, UA3CG and other leading s.s.b. operators. During that discussion an idea was born and it was decided to build a portable rig and send it round the Union. This job of designing and building the transmitter was assigned to three Moscow amateurs, UA3CR, UA3CG and UA3FE, and they at once commenced the task, sparing no midnight oil. At last the rig was ready for test and the signals were checked by UA3DR at his station, who

WPX HONOR ROLL

C.W. WPX

V2HMJ	668
V5KC	619
V8KPL	610
V2AIW	598
V6KG	574
V2EQS	572
K6CQM	565
V50LG	564
V2NUT	550
V4OPM	549
V9YSX	544
V9UXO	542
K2UKQ	535
V2HO	526
DL1QT	518
K9AGB	515
V1IJB	513
V1EQ	512
V6WO	511
W2GT	510
SM7MS	510
V8LY	506
W9DWQ	506
W9GFF	503
G3EYN	503
YU1AG	503
W5LGG	502
W6YY	502
IT1AGA	502
K2CPR	501
W9SFR	501
K2ZKU	500
G2GM	499
W2MUM	495
W1WLW	494
SM5CCE	488
W4BYU	487
ON4QX	486
W8PQQ	481
W4HYW	478
W3OCU	466
K6SXA	464
W2KIR	463
PY4OD	462
JA2JW	461
W9WCE	458
W3BCY	457
DL3RK	454
K9EAB	451
PAØLOU	451
W3PGB	450
DL1YA	450
DL9KP	450
W8JIN	449
W9UZS	447
W8RQ	445
W3AYD	443
OE1FF	442
LA5HE	437
W3BQA	437
W8UMR	429
WØAUB	429
W2RA	428
K5LIA	428
OK1MB	428
W3CGS	426
W1EIO	425
SM5WI	424
WØPGI	420
HB9TT	419
OK3EA	419
W8IBX	416
W6MCX	416
K2PFC	415
W5AWT	412
W5DA	412
WA2DIG	411
K5LZO	411
W2PTD	411
W4DKP	410
W1CKU	408
K4JVE	407
W5AFX	407
W7HDL	405
W4YWX	404
W9IHN	403
VE6VK	403
K4TEA	402
G3HIW	402
WØVBQ	401
IT1TAI	401
VE3JZ	401
VE4OX	400
VK3KB	400

Phone WPX

CT1PK	587
G3DO	565
W9WHM	562
W8WT	561
W9YSQ	471
MP4BBW	454
PAØHBO	453
W6YY	448
G8KS	430
VK6RU	421
W3AYD	420
W9UZC	418
F8PI	418
PZ1AX	413
K2CJN	409
DL3TJ	404
W1UOP	402
G3NUG	400
OE1FF	382
SP7HX	381
TG9AD	381
DL6VM	376
PAØSNG	369
K9EAB	366
G3FKM	366
W8UMR	363
SM3EP	361
W5ERY	358
W8JIN	356
PY2CK	354
5A5TO	353
W1ORV	351
LA5HE	351

S.S.B. WPX

MP4BBW	462
W4OPM	451
G3AWZ	428
HB9TL	423
W3NKM	402
G8KS	390
G3DO	367
G3NUG	356
TI2HP	356
W3MAC	354
K9EAB	350
PZ1AX	345
W2HXG	324
W2VCZ	320
W2YBO	318
W8PQQ	315
W1ORV	307
K4PUS	305
W6YMV	304
K1IXG	303
K2TDI	300
WA2SFP	300
KØRDP	300
WØCVU	291
W1VOP	273
K2JFV	266
K2MGE	263
W3AYD	262
DJ3CP	260
VE3BKL	259
W3VSU	256
XE1CV	256
G3FKM	255
UR2AR	255
TG9AD	252
W4RLS	251

MIXED WPX

W8JIN	605
G3DO	597
W4OPM	595
W3OCU	588
W8WT	583
W6YY	570
W4BYU	557
K9EAB	553
W3AYD	552
HB9EU	551
YU1AG	533
W2GT	528
G8KS	520
W5LGG	509
W9DWQ	508
K2ZKU	508
W3KDP	501
W8UMR	500
LA5HE	500

gave the verdict that the performance was good. By that time the Soviet Federation of Radiosport had mapped out the first trip of the rig which was to go to the Town of Kyzyl in Tuva (Zone 23). This zone was a rare catch on c.w., let alone phone, and an s.s.b. station was going there for the first time in history. Problems of organization, including financial issues, were quickly settled and the candidate to man the rig was selected. This was UA3FE, Seva, one of the three creators of the rig and he started off for Tuva on January 25, 1961.

"The Tuva area presented to all of us quite a puzzle at that time for on almost any day one could make contacts within 200 miles of Kyzyl, but the amateur station in the city, UAØKYA was hard to catch. Not being sure of the reason for this and to make certain that we would not miss anything we drew up rigid schedules for Seva to follow. In the early afternoon of the day before the first schedule with Kyzyl, which had been arranged for 0700 Moscow time, there were three Leo's, UB5KAB, UA3DR and UA3CR, and one Toly, UB5FJ, taking part in a round table QSO, and saying how hard it would be to contact Seva. The next morning we were interrupted by a Swedish station, SM5CO, who said that he had just worked UA3FE/Ø who was calling us on c.w. 5 kc below our frequency. The portable transmitter was crystal controlled which meant that Seva could not call on our frequency, and so the first s.s.b. QSO between Moscow and Kyzyl was made off schedule. Seva stayed in Zone 23 twenty-five days and enabled many stations to complete their WAZ on s.s.b.

"Next, the portable rig was sent on a tour of the Republics and regions which did not have s.s.b. stations. It was to travel from hand to hand and to stay with each operator for ten days. First it went to Tashkent in the Uzbek Republic in Central Asia in the company of UA4IF, Alexander, a well-known operator from the Volga area, who with two local amateurs, UI8AE and UI8AG, took turns in operating the transmitter for a few days. The roving portable then went to Frunze in Kirghiz, and was ably operated by UM8FZ, Boris, in spite of his great handicap—he has been completely blind since early childhood. The next two operators to borrow the rig were both named Yuri, UJ8AG in Dushanbeh (Tadzhik) and the other UH8DA in Ashkabad (Turkoman). The rig was returned to Moscow and was then taken to Tiraspol in Moldavia by some Moscow hams who were going there for a fox hunt (D/F contest). It landed in the custody of UO5PK, George, and when he was ready to relinquish the transmitter it came back to Moscow again with the noted opera singer, Alexander Ognivtsev, returning from a tour of Moldavia.

"The next man in the line-up did not trust anybody with the rig and came to Moscow himself to collect it. This was UA2AO, Anly, from the town of Kaliningrad, and although he was the last to borrow the rig he made more QSOs than any of the previous operators. UA2AO and UJ8AG, the runner up, both used linear amplifiers but the remainder used the transmitter barefoot. UO5PK made the third highest number of QSOs followed by UM8FZ and UH8DA. All these operators received prizes from the Federation of Radiosport.

It became apparent last summer that the stumbling block for many amateurs toward WAZ on s.s.b. was Zone 19. It had been represented by UAØLA but it seemed that very few stations had received a QSL from him. It was decided, therefore, that the roving rig should go to Zone 19 and on a round-table on a Sunday in August of 1961, the leading sidebanders were deciding on the best place and who should take the transmitter. Both UAØBP Ros, and UA3AT, Victor, insisted on going, as Ros argued that his QTH was nearest to Zone 19, while Victor was prepared to spend his forthcoming holiday operation on s.s.b. In due course, both operators went to the town of Blagoveshehensk in the Amour River basin, where the local club supplied all the necessary equipment including a power amplifier and aerials. The station was set up in time for the telephony section of the *CQ* World-Wide DX Contest and despite poor band conditions, Ros and Victor managed to chalk up more than a thousand contacts between them.

That is the story of the rovings of the rig during 1961, but they are not yet over. It is still good for more DX."

AC3 Sikkim: Shankar, VU2AX, ex-FN8AD/AC4AX arrived for a tour of duty in Sikkim on Oct. 8th. W4QCW is corresponding with him and if things work out satisfactory the *Yasme* Foundation is prepared to send him an HT-37 and SX-101. W4QCW will be the QSL manager. Present Sino-Indian border war may force a delay on this.

HL Korea: Frank Borsody, W2AYN, EP5X, EP2AT, is in Seoul where he is awaiting delivery of a KWM-2. Upon its receipt, he will open up as HL5X. Frank is working with the Republic of Korea Ministry of Communications and the National Police of Korea, setting up an Interpol Radio Net as he did in Iran. Correspondence to Frank should be sent via Frank Borsody, HL5C/W6AYN, USOM-TC/PS, APO 301, San Francisco, Calif. *(Tnx W6ZY)*

JY Jordan: Domenico, IT1TAI, and Pietro, IT1ZGY, are planning a DXpedition to Jordan soon as JY2TAI. W4VPD will act as their QSL manager. *(Tnx WGDXC)*

The rig of OY7ML in the Faroe Islands. Martin has a greatly improved signal since the installation of a tri-band beam. *(Tnx K2UKQ)*

On the left is the shack of JA2EM in Nagoya and on the right, JA7AB in Akita. In both cases, all equipment is homebrew with the exception of the receivers. *(Tnx JA2JW)*

ST2 Sudan: Eric, ST2AR, now has a homebrew s.s.b. rig, 100 watts p.e.p., with the following frequencies available: 14,113, 14,240 and 14,300. *(Tnx WGDXA)*

VK4W Willis Island: VK5AB brings us up to date on the proposed Willis DXpedition. Bram possesses a license for Willis Island—VK4WE. The license is valid for one year and is renewable. Bram has been negotiating for a boat suitable to make the trip and has located one—with a price tag of $200.00 per day. If enough money can be raised, this boat will be used. In the event it can't, there would appear to be an alternative. A relief boat is scheduled to visit Willis in June. Should the chartering of a boat fall through, Bram intends to try to secure passage on the relief boat but its schedule will be such that it will limit operation to 36 hours only. Bram will keep us informed on the latest—one can only add that this is one DXpedition that a lot of us would like to see fly. Bram also possesses the necessary paper work for two other rather juicy spots—Portuguese Timor and Christmas Island (Indian Ocean). Bram has permission to operate from Dili, Port Timor as well as a visa to visit the island. Lastly, Bram has permission to operate on Christmas Island as well as a promise of accommodations on the island. This latter item is of no small importance since no one is permitted on the island unless they have accommodations awaiting them. *(Tnx WGDXC)*

VP4 Trinidad: All DXers who prefer to use the QSL Bureaus should note that Trinidad and Tobago now have a Post Office Box number to speed things along the way. Address card to P. O. Box 756, Port of Spain, Trinidad.

Independence celebration of August made *one* new nation out of the Islands of Trinidad and Tobago. No indication at present of any change of the VP4 prefix.

VP4NC's good intentions with trip to Tobago were frustrated by beautiful weather, terrific beaches and active harmonics. Only 16 countries were contacted. Better luck next time. *(Tnx VP4NC)*

VP8 South Georgia: ex-VP8EG, who was active from S. Orkneys, some months ago, is on his way to S. Georgia, where he will stay for about a year. The only ham on S. Georgia, VP8GF, has no time for hamming, due to traffic. *(Tnx VERON)*

5T5 Mauritania: 5T5AI is another welcome addition who seems to do all his operating on 40 meters. He is definitely good and QSLs have been received in the states. He hangs out between 7005 and 7010 with a drifting, badly-chirping signal. When he comes on, his signal drifts down about 5 kc and stops drifting after a few seconds. Name is Gerhard and QSLs go to Box 208, Noukchott, Mauritania. Alban, 5T5AD, who works for the phone company is leaving in December and does not know if he will go back. This will leave only 5T5AB and 5T5AI to hold the fort. *(Tnx NEDXC)*

This neat station belongs to DJ3OJ. Heinz can be found on almost any phone band.

160 Meters

DX in all directions since October 1st have been extremely poor, although some spotty DX has broken through to W/VE, namely, VP8GQ, HR3HH and DL1FF. European "Markers" have been conspicuously absent except for the briefest moments.

This raises a question as to what has happened to 160 meter DX. Up until October, it was our best year, with the earliest Trans-Atlantic crossing on record and lots of Southern Summer DX including VP8, ZL, VK, etc. and, apparently, continuing to improve while the Sunspot Numbers decreased, as expected.

However, rather suddenly from the 1st of October on, it has been almost as though a DX barrier had been thrown up, which even the strongest DX signals can not penetrate.

Many are wondering if the Pacific nuclear tests could be responsible for upsetting the ionosphere and casting a "blanket" over 160?

All 160 meter DXers are active and holding on, hoping for the "break" to come soon.

Most active W/VE Participants are: W1BB, TX, ME, UZ, WY; K1IMO, 2EKS, FYT, IU, UWD, KGT; W3GQF, FBV; W4CXV; W5KG, NU, SOT; W6KIP; WA6CDR; K7DEK/7, HDB; W8GDQ, IQS, CIJ; K8IQQ; 8HGW; W9PNE, UKV; K9JDK; WØNWX, IFH, GBV, VXO; VE1ZZ, 3QU, DU, FF. DX Participants are: G6BQ, G3ERN, LIQ, PU, CHN, OIT, PQA, IGW, PU; G5RI, G6GM, G8PG, GM3IAA, GM3IOS, GD3UB, HR3HH, VP8GQ, EI9J, UB5WF and others. *(Tnx to Stew, W1BB, for the above 160 meter report)*

Propagation Forecasts

DX chasers may find the WWV and WWVH forecast service an excellent guide to current conditions over the North Atlantic path (WWV) and over the North Pacific path (WWVH). They are broadcast in c.w. on each frequency (WWV-2.5,5,10,20, 25 mc; WWVH 5, 10, 15 mc) at 19.5 and 49.5 minutes past each hour on WWV and at 9.4 and 39.4 minutes past each hour on WWVH.

Information is given on the current condition of the ionosphere as well as a six-hour advance prediction. New forecasts are issued at 0500, 1200 (1100) in summer, 1700 and 2300 MT. The forecast is broadcast as a letter and a digit. The letter identifies conditions at the time the forecast was made. The digit indicates conditions expected over the six-hour period after the forecast.

W-Disturbed conditions; *U*-Unsettled conditions; *N*-Normal conditions. 1.) Useless; 2.) Very poor; 3.) Poor; 4.) Poor-to-fair; 5.) Fair; 6.) Fair-to-good; 7.) Good; 8.) Very Good; 9.) Excellent.

One of the best known and most active s.s.b. DX stations is Martin, VR3O. Martin also operated as VR3S and he was instrumental in forming VR3L/VR1 DXpedition. *(Tnx WA6MAZ)*

This neat station belongs to UI8AC who has recently been added to the s.s.b. ranks. *(Tnx UC2AA)*

Certificates

GUADALAJARA AWARD

1.) All contacts must be made after August 18, 1962. 2.) Forms of transmission will be c.w., a.m. and s.s.b. or any of the combinations. 3.) XE Stations must make contact with 10 station members of the Radio Club. 4.) KL7, VE, W, K stations the Carribean, Central and South American stations must have at least 5 contacts. 5.) European stations, African stations, Far East (Pacific Coast) VK, ZL, and South Pacific (KH6 included) will need 3 contacts. 6.) Radio Amateurs who are entitled to the award must send only letter signed by President of local Radio Club certifying the possession of respective QSLs. 7.) All requests must be accompanied by 10 International Reply Coupon. 8.) Station members of Radio Club: XE1's, EH, FFU, FFV, FN, GGH, GGX, HHH, HK, IW, MV, NT, RM, SN, TJ, UE, YC, CDX, DDN, GGS, UF.

WORKED ALL NORTHERN RHODESIA

Send claims to Awards Manager, NRARS, P. O. Box 332, Kitwe, N. Rhodesia, for contacts with VQ2s as follows:

Zones 36, 37 & 38; 20 VQ2s in 8 different towns. All others; 10 VQ2s in 5 different towns.

Contacts post War, any band or mode. Send list certified by an official of a Radio Society or two other licensed amateurs that the QSL cards confirming these contacts are in your possession, together with 7 IRCs, 3/6d Postal order or $1.

Contacts with the same VQ2 in more than one town (fixed or mobile) count for separate contacts and separate towns.

This certificate available also to s.w.ls on same basis. *(Tnx VQ2AT)*

QTHs QSL Managers

CN8IU	T/Sgt. A. E. Pittman, P.O. Box 2104, 1981 Com. Sqdn. APO 30, N.Y., N.Y.
CR7FH	Dr. Antonio V. D. Gomes, POB 852, Beira, Mozambique
CR7IZ	Box 95, Porto Amelia, Mozambique
CR8AC	Aurelio Fernando de Brito Seco Capitania Dos Portos, Dili, Portuguese Timor
DU1FM	Box 770, Manila, Philippines
DU7IM	Ignasio Montenegro, Bais, Oriental Negros, Philippines
EL6A	Box 44, Monrovia, Liberia
ex-EP5X	See HL5X
ex-EQ2AT	See HL5X
ET3LM	POB 1014, American Embassy, Addis Ababa, Ethiopia
ET3RC	via K1KOM
FA3CT	via W2CTN
FG7XJ	via W2CTN
FG7XQ	Box 521, Pointe-a-Pitre, Guadeloupe
FG7XT	Box 185, Pointe-a-Pitre, Guadeloupe or via K5AWR
FP8BD	via VO1FB or G3LMD
FY7YI	SSB via W4JQM, others via W3AYD
GB2LA	via RSGB or G3MCN
GC2HFD/A	(on Sark Is.) via G3EIL
HC0NE	Box 2951, Quito, Ecuador
HL5X	B. Frank Borsody, USOM-TC/PS APO 301, San Francisco, Calif.
HL9KN	via W3MVK
HM5BF and **HM8BG**	Kim and Lee, POB 4, North Pusan, Rep. of Korea
HK0ZU	via W4BJ
JT1AG	Box 639, Ulan Bator
JY2TAI	via W4VPD
KG4AM	via W2CTN
KJ6BZ	via WB6APH, 744 GAE., Coronado, Calif.
KL7DBG/KS6	Detachment A, JTF8, APO 953, San Francisco, Calif.
KL7DBG/LS6	11750 S. Homan, Box 17A, Chicago 55, Illinois
KV4CY	Box 1767, St. Thomas, Virgin Islands
LA9RG/P	via LA5AD
LX3TA	via DLITA or DARC
OA9F	Harry, POB 538, Lima, Peru
PY4RT/7	via PY4TK
TF2WGU	AF Unit, Box 6, Navy 568, FPO, N. Y., N. Y.
TI2HK	Hans Kohn Piszk, POB 582, San Jose, Costa Rica
VP4RS	Rudolph Samlal, Palmyra Village, San Fernando, Trinidad
VP7BP	via W2CTN
VR2DS	POB 210, Nadi Airport, Fiji Islands
VR5AR	via W9EXE
VS4RM	Rodney Maull, Tanjong Lobang School, Miri, Sarawak
VU2BK	Rustom Z. Kabraji, School of Signals, 154 Whitly Rd., Mhow MP, India
VU2NR	B. A. N. Raju, Begumber Airport, Secunderabad, India
W4LCY/KM6	via W4LCY
W6POP/KJ6	via KH6EGO
XE1SS	Box 31159, Mexico City, Mexico
XT2Z	via HG9ZY
XW8AT	OICC, c/o U. S. Embassy, Vientiane, Laos
YN9MQ	Rafael Moline, Jinotega, Nicaragua
YV2DW	POB 22, Barinas, Venezuela
ZC5FF	via G3KOJ
ZD9AM	via W4ECI
ZK1BY	via W8EWS
ZL1ABZ	via ZL2GX
ZM6AB	via K8RTW
4U1ITU/SU	Walter Baumgarten, Chief Comm. Officer, UNEF, Base Post Office, Beirut, Lebanon
5A3CR	Radio Club RAF, Eladem, BFPO 56, London, England
5T5AI	Box 208, Noukchott, Mauritania
5U7AD	Jo. Niamey Airport, Niger Republic
6O1ND	via W4KUA
9G1EE	POB 233, Tema, Ghana Rep.
9Q5KS	Box 590, Kolwezi, Katanga, Congo
9U5DR	Dave Riley, Kiwsumo, Ruyigi, Burundi

73, Urb, W2DEC

PROPAGATION

GEORGE JACOBS*, W3ASK

LAST MINUTE FORECAST

The following is a forecast of day-to-day propagation conditions expected during January, 1963. This forecast attempts to predict *specific* days upon which openings shown in the Propagation Charts in this column are most likely to occur, and the expected quality of the openings. For example, the following forecast shows that circuits rated (2) in the Propagation Charts are most likely to open with "good-to-fair" quality (B-C) when conditions are above normal (January 4-5, 22 and 31), and with "fair-to-poor" quality (C-D) when conditions are expected to be normal. Circuits rated (2) are not expected to open on those days forecast to be "disturbed", etc.

PREDICTED PROPAGATION CONDITIONS & CIRCUIT QUALITY

Prop. Chart Forecast Rating	*Above Normal Days (WWV rating 7 or higher)* Jan. 4-5, 22, & 31	*Normal Days (WWV rating 5-6)* Jan. 1-3, 6-8, 11-15, 21, 23-25, 27-30	*Below Normal Days (WWV rating 4)* Jan. 9-10, 16, 20 & 26	*Disturbed Days (WWV rating 3 or less)* Jan. 17-19
(1)	C	D-E	E	E
(2)	B-C	C-D	D	E
(3)	A-B	B-C	C-D	D-E
(4)	A	A-B	C	D

Where:

A—An excellent opening, with strong steady signals.

B—A good opening, moderately strong signals, with little fading and noise.

C—A fair opening, signals fluctuating between moderately strong and weak, with moderate fading and noise.

D—A poor opening, signals generally weak, with considerable fading and high noise level.

E—A very poor opening, or none at all.

THE following is an overall picture of h.f. band conditions forecast for January, 1963. For specific times of DX openings refer to the DX Propagation Charts which appeared in last month's column. This month's column contains Short-Skip Propagation Charts for January and February, as well as Charts centered on Hawaii and Alaska. The Short-Skip Charts contain propagation forecasts for circuits varying in length between distances of 50 and 2,300 miles.

*11303 Clara St., Silver Spring, Md.

6 Meters

Some meteor-type short-skip openings are likely to occur during the *Quadrantids* meteor shower expected between January 1-4. Sporadic-*E* and auroral-reflection short-skip openings may also occur during periods of disturbed propagation conditions. Check the "Last Minute Forecast" at the beginning of this column for the days that are most likely to be disturbed during January.

10 Meters

A few DX openings, mainly to southern and tropical regions are expected during the daylight hours. Some short-skip openings, between distances of approximately 1,300 and 2,300 miles, are also forecast during the late morning and early evening hours. Sporadic-*E*, meteor-type and auroral short-skip openings may also occur up to distances of approximately 1,300 miles.

15 Meters

Generally fair 15 meter DX openings to many areas of the world are forecast for the daylight hours. Some circuits to southern areas may remain open through the late afternoon and early evening hours during periods of good propagation conditions. Fairly consistent short-skip openings, as a result of regular *F*-layer reflection, are predicted for the daylight hours over distances ranging between approximately 1,000 and 2,300 miles. Some short-skip openings may also result from meteor and auroral reflections, and from sporadic-*E* propagation.

20 Meters

Fairly good DX openings to most areas of the world are forecast for 20 meters sometime between sunrise and the late afternoon hours. Signal levels may be exceptionally high shortly after sunrise and during the afternoon hours, when conditions peak. Good short-skip openings, over distances ranging between 750 and 2,300 miles, should take place during the daylight hours. Openings over shorter distances should be possible during the early afternoon hours, when the skip distance may be as short as a few hundred miles. Twenty meters is expected to be the best band for DX during the daylight hours.

40 Meters

DX openings are expected to begin during the late afternoon hours, with conditions peaking during the hours of darkness. The band is expected to remain open to some DX areas until shortly after sunrise. Atmospheric noise, or static, should remain at low seasonal levels during the month, and signals often may be exceptionally strong. During the daytime hours good short-skip openings should be possible between distances of approximately 150 and 750 miles. During the hours of darkness, the short-skip range should increase to between 1,000 and 2,300 miles.

80 Meters

Ionospheric absorption and static levels are expected to remain at low seasonal values during January, resulting in fairly good DX openings to many areas of the world during the hours of darkness. During the daytime

TABLE 1

Values of smoothed sunspot numbers observed during the present sunspot cycle, and those predicted for the remainder of the cycle. Predicted values are shown in italics.

Year 1954	1955	1956	1957	1958	1958	1960	1961	1962	1963	1964	1965
Month											
Jan	14	89	170	199	179	129	79	44	*28*	*14*	*5*
Feb	16	98	172	201	177	125	75	41	*27*	*13*	*5*
Mar	19	109	174	201	174	122	69	89	*26*	*12*	*5*
Apr 3	23	119	181	197	169	120	64	38	*26*	*11*	*5*
May 4	29	127	186	191	165	117	60	*37*	*25*	*9*	...
Jun 4	35	137	188	187	161	114	56	*36*	*24*	*8*	....
Jul 5	40	146	191	185	156	109	52	*35*	*22*	*7*	...
Aug 7	46	150	194	185	151	102	52	*34*	*21*	*7*	..
Sep 8	55	151	197	184	146	98	52	*32*	*19*	*6*	...
Oct 8	64	156	200	182	141	93	51	*31*	*18*	*6*	...
Nov 9	73	160	201	181	137	88	50	*30*	*17*	*5*	...
Dec 12	81	164	200	180	132	84	48	*29*	*16*	*5*	..

hours, short-skip openings should be possible between distances of approximately 50 and 350 miles; during the hours of darkness, openings should be possible between distances of approximately 250 and 2,300 miles.

160 Meters

Off to a good start in October, DX conditions appear to have fallen off considerably during November. There is no explanation for this fall-off, and conditions should improve during January. On evenings when static levels are exceptionally low, fair DX openings should be possible to some areas of the world from a few hours after sunset to shortly before sunrise. Short-skip openings up to 2,300 miles should be possible during the hours of darkness. Because of extremely high solar absorption in this frequency range, ionospheric propagation generally is not possible during the daylight hours. Trans-Atlantic propagation tests are scheduled for 160 meters between Midnight and 2:30 A.M. EST on January 6 and 20. See last month's column for more details.

Sunspot Cycle

The Swiss Federal Solar Observatory at Zurich reports a monthly sunspot number of 40 for October, 1962. This results in a 12-month smoothed sunspot number of 38 centered on April, 1962. This month's *CQ* propagation forecast is based upon a predicted smoothed sunspot number of 28.

1962 In Review

1962 marked the eighth year of the present sunspot cycle, which began during April, 1954, and reached a peak during March, 1958. Sunspot activity continued to decline during 1962, but at a much slower rate.

The year began with a smoothed sunspot number of 44, and by December solar activity had declined to an estimated SSN of 29. Solar activity during 1962 was approximately half the level recorded during 1961, and the lowest since 1955. The year marked the beginning of the "minimum phase" of the present cycle.

The bands most adversely affected by reduced sunspot activity during the past year were 10 and 15 meters. While 10 meters opened fairly regular for DX to many areas of the world during the daytime hours of the fall, winter and early spring months of 1960-61, there were very few such openings during 1962. Fifteen meter DX openings also were noticeably fewer than during 1961. Often, when the band did open, it was usually for much shorter periods of time and to fewer areas of the world than during previous years of higher solar activity.

The 20 meter band was also adversely affected by poorer propagation conditions during 1962, but to a lesser degree than 10 and 15 meters. The most noticeable change in 20 meter propagation conditions during 1962 was the large reduction in late afternoon and early evening openings. During the past year, 20 meters was the optimum DX band during the daylight hours, with conditions peaking shortly after sunrise and again during the early afternoon hours.

While a weaker ionosphere adversely affected propagation conditions on 10, 15 and 20 meters during 1962, conditions on 40, 80 and 160 meters *improved*. This improvement resulted from the marked decrease in ionospheric absorption associated with a weaker ionosphere. Signals, both DX and short-skip, were noticeably stronger on 40 meters, and the band opened more frequently for DX, and to more areas of the world than during recent years. In fact, during 1962, 40 meters was the best band for DX during the hours of darkness. The improvement in propagation on conditions on 80 and 160 meters, although not as outstanding as on 40 meters, also resulted in stronger signals and a greater number of DX openings during the hours of darkness.

Sporadic-*E* short-skip openings, for distances up to approximately 1,300 miles, were somewhat more numerous during 1962 than the previous year. Almost daily openings took place on 15 and 10 meters, and frequent openings also occurred on 6 meters, during the late spring and summer months when sporadic-*E* propagation was most prevalent. This tends to support the belief that sporadic-*E* propagation *increases* as solar activity declines.

Considerably fewer VHF ionospheric openings occurred during 1962. This probably results from a marked decrease in auroral displays, which tend to occur far less frequently during periods of low solar activity than during other phases of the solar cycle.

Shortwave propagation conditions during 1962 were, therefore, generally poorer on 10, 15 and 20 meters, and improved on 40, 80 and 160 meters. There was a greater amount of sporadic-*E* propagation, but fewer VHF auroral openings during the year.

The sunspot cycle is expected to continue its slow decline during 1963. A smoothed sunspot number of 28 is forecast for January, and the cycle is expected to decline to 16 by the end of the year. This is approximately the same level of activity experienced in 1953.

According to latest estimates, the present cycle is expected to continue to decline until it reaches a minimum value sometime between November, 1964 and April, 1965. Table I lists the smoothest sunspot numbers observed during the present cycle, as well as *CQ*'s forecast for the remainder of the cycle.

The continued decline expected in solar activity during the coming year should result in a further decrease in the number of 10, 15 and 20 meter DX openings. Except for daytime circuits to some southern and tropical regions, very few DX openings are predicted for 10 meters during 1963. Fewer 15 meter openings are expected than last year, but DX should be possible to many areas of the world during the late fall, winter and early spring months. When 15 meter openings do take place, they will most likely occur during short periods of time from a few hours before noon to a few hours after noon. DX openings on 20 meters will be confined generally to th period between sunrise and the early afternoon hours, and there may be many areas of the world to which the band will not open except on rare instances. Twenty meters should be the best band for working DX during the hours of daylight.

On the other hand, DX conditions on 40, 80 and 160 meters are expected to continue to improve during 1963. A greater number of DX openings are forecast for each of these bands, to more areas of the world than during the past year, and with noticeably stronger signals, especially on 80 and 160 meters.

Sporadic-*E* propagation is expected to continue to increase in both occurrence and intensity during 1963. Record-breaking short-skip openings are likely to occur on 6 and 10 meters during the late spring and summer months.

Fewer auroral-type VHF ionospheric openings are expected to occur during 1963, since the sun is going through a quiet period as solar activity continues to decrease.

Shortwave propagation conditions during the coming year, therefore, are expected to be poorer on 10, 15 and 20 meters, but improved on 40, 80 and 160 meters. Fewer auroral-type VHF openings are expected, but record-breaking sporadic-*E* propagation may take place during the late spring and summer months.

73, George, W3ASK

[See Page 102 For Short Skip Charts]

CONTEST CALENDAR

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

FRANK ANZALONE*, W1WY

CALENDAR of EVENTS

January	26-27	*CQ* WW 160 C.W.
January	26-28	New Mexico Party
February	9-11	ARRL DX Phone
February	16-17	BERU
February	16-17	QCWA Party
February	23-25	ARRL DX C.W.
March	2-3	YL/OM Phone
March	9-11	ARRL DX Phone
March	16-17	YL/OM C.W.
March	23-25	ARRL DX C.W.
March	23	APDX (Pakistan)
March	30-31	*CQ* WW SSB
March	30-31	REF C.W.
April	6-7	HELVETIA 22

CLAIMED SCORES

1962 CQ WW Phone Contest

Single Operator

All Band

HC1DC	426,972
W1ONK	210,840
K3UDX	206,640
HB1ZY	150,000
KP4AVQ	146,778
K6CTV	121,380
CN8IU	109,632
W2TVR	97,696
K9EAB	96,720
WA2SFP	90,592

28 Mc

K5SBN	8,134
K6CT	6,720
W3EGD	5,240
K4QWM	5,076
K2ANR	3,636

21 Mc

9G1YL	72,324
JA1ANA	35,186
YV5AHG	31,119
K9ECE	25,110
VE3CBY	18,060
JA1CWP	17,415
G3OPJ	15,732
W6BSY	14,575
W5AJY	12,998
K5UYF	11,685

14 Mc

KA2JL	203,252
XE1AE	75,222
KH6EKO	74,732
W8CAU/CN8	52,836
I1AMU	50,688
W4BCV	48,906
K2IEG	44,100
W4AZY	42,594
K1RTB	42,282
JA1ANA	35,186
WA2HOK	30,378
W5KC	24,160
KH6CKO	21,291

7 Mc

W3PHL	7,379
K2GXI	7,065
K6AHV	1,349

Multi-Operator

Single Xmtr

W4GFB/KH6	167,090
W8NGO	87,522
W4VZB	61,375

Multi-Xmtr

W3MSK	547,768

*14 Sherwood Road, Stamford, Conn.

Average conditions for our World Wide contest were not too bad during the Phone section. It seemed to be a matter of opinion depending on the location but all in all I would say that considering the sun spot cycle we are now experiencing, it could have been much worse. On 80 it was mostly due to a lack of activity, whereas on 40 it was a matter of trying to digging thru the commercial and European propaganda that now occupies the whole band. Once again, it was 20 that carried the load but 15 was not lacking in activity altho the path to Europe was of short duration. And the few diehards who will not abandon 10, found the going a little less difficult than last year.

The following list of claimed score should give you an idea. But bear in mind they are just that, *claimed scores only*, of a few of the early logs received before this was written. (Middle of November)

CQ WW 160

Starts: 0200 GMT Saturday, January 26th.
9 P.M. EST Friday, January 25th.
Ends: 1400 GMT Sunday, January 27th.
9 A.M. EST Sunday, January 27th.

This is a world wide contest, as proven by a survey made by Charlie O'Brien, W2EQS who advised us that stations from 19 different countries participated in last years contest, altho logs were not received from all these areas.

With additional countries now permitting 160 activity, its almost certain that this figure will be exceeded this year.

Following is a repeat of the rules as listed in last month's CALENDAR.

1. This is a c.w. contest only.
2. For W/VE/VO contacts with other W/VE/VO stations, 2 points per QSO. Contacts with other countries, 10 points per QSO.
3. For all other countries, 2 points per QSO with stations in the same country; 5 points per QSO with stations in other countries. Except for contacts with W/VE/VO stations, which will count 10 points.
4. For all stations: A multiplier of 1 for each State, Canadian province or foreign country worked.
5. Final score: Total points multiplied by the total multiplier.
6. Serial number: RST report plus a progressive number starting with 001 for the first contact.
7. Sample exchange: W1BB 589001 Mass.

Hawaii will be considered a "foreign country" for QSO and multiplier credit. And the District of Columbia counts same as Maryland.

Certificates to the Top station in each State, Canadian province and foreign country.

Your logs should be postmarked no later than February 18th and they go to: *CQ*, Att: 160 Contest, 300 West 43rd Street, New York 36, N. Y.

A few pointers if you are new to the Top Band. Look for foreign stations just outside the high end of the 1800-1825 kc segment used by the east coast stations. West coast stations, of course, occupy the 1975-2000 kc section and have to be worked cross-band from the east coast.

Also remember that there are regulations regarding frequencies and power. And some States and many foreign countries are not allowed to use 160. See chart below for stateside regulations.

Area	Authorized Bands, Kc	D.C. Plate Input Power in Watts	
		Day	Night
Minnesota, Iowa, Wisconsin, Michigan, Pennsylvania, Maryland, Delaware, and states to the north of these including the District of Columbia	1800-1825	500	200
North Dakota, South Dakota, Nebraska, Colorado, New Mexico, and states to the west of these states (except State of Washington)	1975-2000	500	200
State of Washington	1975-2000	200	50
Oklahoma, Kansas, Missouri, Arkansas, Illinois, Indiana, Kentucky, Tennessee, Ohio, West Virginia, Virginia, North Carolina, South Carolina, Texas (West of 99°W or North of 32°N)	1800-1825	200	50
Hawaiian Islands	1975-2000	500	200
Texas (East of 99°W and South of 32°N), Louisiana Mississippi, Alabama, Georgia, Florida, Puerto Rico, Virgin Islands, Alaska, Guam and other Territories and Possessions of the U.S. not listed above.	None	No Operation	No Operation

New Mexico Party

Starts: 1500 GMT Saturday, January 26th.
10 A.M. EST Saturday, January 26th.
Ends: 0300 GMT Monday, January 28th.
10 P.M. EST Sunday, January 27th.

1. Use all bands, phone and c.w. The same station can be worked once on each band and mode. (A phone and c.w. contact on the same band counts 2 points.)

2. Scoring: New Mexico stations, 1 point per contact, and a multiplier of one for each State, US possession, Canadian province and foreign country worked.

Outside stations: 3 points for each contact with a New Mexico station and a multiplier of 1 for each New Mexico county worked.

3. Contact information: New Mexico stations will indicate their QSO number, RS or RST report and their county.

Other stations, their QSO number, RS or RST report and their state, possession, province or country.

4. Look for activity on these frequencies: 3600, 3835, 7030, 7250, 14080, 14250, 21050, 21300, 28100, 28600, 29000 and 50.28 mc.

5. Certificates will be awarded to the highest scorers in each of the above mentioned areas, plus a special certificate to the highest scorer in the USA. The New Mexico boys will be awarded 1st, 2nd, 3rd and 4th place certificates. Awards will also be made for multi-operator groups.

6. Logs must be postmarked not later than February 28th and they go to: CHC Chapter #1, Att: John C. Kanode, K5UYF, 408½ Cornell Drive, SE, Albuquerque, New Mexico.

Activity is promised from some of the rare counties for you certificate chasers. And how about some 160 operation fellows.

Helvetia 22 Results

USA				Canada		European Winners			
W1KQF	8127	W7PQE	612	KP4CC	864	OH2FS	9504		
W8JIN	5049	K4BAI	360	KR6LJ	540	SP6FZ	6732		
W2WZ	3528	W4KXV	330	4X4JU	351	G3EYN	5208		
K2ELL	2772	W5WZQ	264	VK2PV	168	OK1PG	4536		
W1JYH	2772	W5ARJ	243	MP4BBL	75	SM3TW	4488		
W4SNU	2622	K5IKL	240	JA2JW	75	UB5MZ	3096		
W5WW	2604	K8NMG	75	PY5GA	27	PAØVB	3000		
W1WY	1560	K5UYF	12	JA6PY	18	OZ4H	1605		
W9LKI	1188	VE2NV	1920	XE1PJ	3	UA3XN	1377		
W8SCU	1152	VE3BWY	1596			LA3UF	1350		
W8NAN	882	VE3HB	855			TF3AB	816		
W2QKJ	882	Other Countries				ON4CE	420		
W3OCU	768	UA9DN	5883	DJ2YA	11139	UR2AR	192		
W1RAN	675					F2NZ	90		

ARRL DX

Phone: February 9-11 and March 9-11.
C.W.: February 23-25 and March 23-25.

BERU

Strictly a contest for the boys who are part of the British Commonwealth. The VEs, VP2s, VP9s, *etc.* in this continent. We became ineligible back in 1776, remember? Don't bother calling some of those exotic prefixes you will probably be hearing. If they do answer you their remarks might burn your ears.

QCWA Party

Starts: 2200 GMT Friday, February 15th.
5 P.M. EST Friday, February 15th.
Ends: 2200 GMT Sunday, February 17th.
5 P.M. EST Sunday, February 17th.

This is the sixth annual QSO party when the Old Timers get together and renew old acquaintances. Primarily, it's for QCWA members only but it offers an excellent opportunity for non-members to fatten their QCWA total for the K6BX award.

Members are requested to submit their logs which will make them eligible for the QCWA Plaque donated by National Headquarters.

There is no point scoring or multiplier involved, just see how many QCWA members you can contact.

To make it easier for the judging committee, your log should show in this order; date and time in GMT, contact number, station worked, RST or RS report, QTH, name and QCWA membership number.

The activity will be usually found around these frequencies: C.W.: 3540, 3655, 3790, 7005, 7030, 7100, 14100, 21110 & 28110 kc. A.M.: 3810, 3950, 7230, 14240, 21340 & 28690 kc. S.S.B. (l.s.b.): 3804, 3999, 7204 & 7299 kc. s.s.b. (u.s.b.): 14300, 21410, 21440 & 28690 kc. RTTY (if any) 7105 & 21140 kc.

The Northwest Chapter is running the festivities this year so your logs should be sent to: Stanley Belliveau, W7AYO, P.O. Box 6144, Seattle 88, Wash.

If we do as well for the c.w. week-end we will not do any complaining.

And if George comes up with a surprise week-end like last year, "happy days." Good luck and 73 for now.

Frank, W1WY

SPACE COMMUNICATIONS

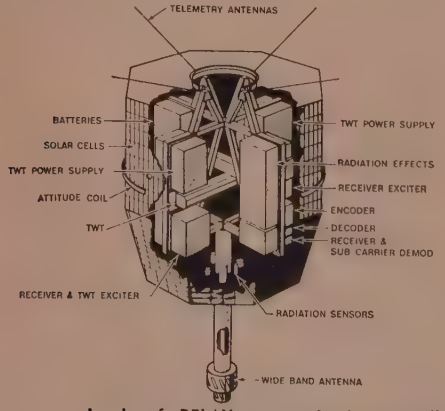
GEORGE JACOBS*, W3ASK

THE year 1962 will go down as another history making year in the newly developing field of space communications.

On June 2, amateur radio again made space communication history with the successful launching of OSCAR II. OSCAR II's 100-milliwatt beacon transmitter, operating on 145 mc in the amateur 2 meter band, was copied by thousands of radio amateurs in all corners of the globe during its three weeks existence in outer space. OSCAR II, the second in a series of satellites built entirely by radio amateurs and launched successfully into space, was another giant step forward for amateur radio in the space age.

On July 10, a milestone in the history of communications was passed with the successful launching of TELSTAR, the world's first active relay communication satellite. Built by the American Telephone & Telegraph Company, and launched for A.T.&T. by the National Aeronautics and Space Administration, TELSTAR operated flawlessly during its first five months in orbit. TELSTAR, as an experimental satellite, has already proven conclusively that inter-continental communication by means of space relay is both technically possible and practical. Among

*11307 Clara St., Silver Spring, Md.



Cut-away sketch of RELAY communications satellite which NASA planned to launch during December, 1962. The satellite contains two independent microwave transmitters, each with a 10-watt traveling wave tube (TWT) final stage. The satellite will also radiate tracking signals on 136 and 4080 mc. *(Nasa Photo).*

Bert Allen G2UJ (right) is shown guiding the hands of Angus McKenzie G3OSS, a blind British amateur, as he "sees" the model of the OSCAR beacon satellite on display at the Radio Communication Exhibition of the RSGB held recently in London, England. G3OSS was among the first foreign radio amateurs to track and copy OSCAR 1.

the multitude of TELSTAR achievements was the dramatic exchange of live television broadcasts between North America and Europe. TELSTAR made it possible for more then 200 million people in eighteen European countries and in the U.S.A. and Canada to become arm-chair tourists as live television cameras scanned Europe from the Arctic to the Mediterranean, and North America from Quebec to the Mexican border.

The year 1962 was also a banner year for that new breed of radio enthusiast, the "space-listener". With a total of more than fifty successful space launches during the year by both the United States and the Soviet Union, it was possible to tune in and listen to three American astronauts and two Russian cosmonauts as they whizzed through space in their spacecrafts. It was also possible to receive a wide assortment of telemetry and beacon signals from satellites of various sizes, shapes and purposes, orbiting the earth at distances in space varying between a hundred, and millions of miles.

Transmitting Satellites

According to information made available by the National Aeronautics and Space Administration, transmitters on the following fourteen satellites were still in operation during early December, 1962.

[*Continued on page 116*]

the USA-CA PROGRAM

CLIF EVANS*, K6BX

A NEW Year's Greeting to those who follow the OLD MAN's USA-CA column. From the many letters received, our reader ranks are rapidly growing as the true nature of "USA-CA Fun Unlimited" is unfolded. USA-CA, as we have often stated, is not just an award, or even limited to an awards program . . . it is a vast personal achievement program available to all. It encompasses hundreds of hobbies and satisfies pleasure to suit anyone's individual tastes and values. Importantly, while it serves individual needs, participation helps serve the needs of many others, together with promoting overall hamdon interests.

The all encompassing aspects of the USA-CA Program are such that we feel completely free to use this column for free-press discussion of many of hamdon's problems and assets. We will continue, during 1963, to editorialize on whatever timely subjects are pertinent to thinking folks. Likewise, we will continue to pass on to you what others think. Our only limitation will be, as usual, the 'blue pencil' of that Editor swab in New York.

Among the many purposes of USA-CA is to help clubs, organizations and journals extract the greatest possible good publicity from amateur awards and certificate programs, contests, QSO Parties, and other special events to which amateur radio can be a significant party. Awards programs have primary import in creating purpose, media, vehicle, yes even opening doors at high level. Through amateur contributions to the art and science of communications as well as society, we can be portrayed as a valuable asset to our community, its leaders, and citizens at all levels. Those amateurs who sneer at achievement certificates as just "wall paper," are either somewhat ignorant of public relations processes or are too personnally and mentally lazy to 'educate' themselves. Our letters have been running an astounding 100 to 1 in commending USA-CA and stated goals. We *know* we are on the right track with that kind of 'agreement' and backing. So Mote It Be.

Latest USA-CA-500 Winners

Ten beautiful USA-CA parchments adorn that many lucky winners' walls since last issue *CQ*. They are:

USA-CA-500

K2UPD . . . 130	WØTFQ 133	SM7ID 136
W5PQA . . . 131	ZL4CK 134	W3TKQ . . . 137
K7CPC 132	CO8JK 135	W9SZR . . . 138

*United States of America Counties Award Custodian, Box 385, Bonita, California.

USA-CA-1000

K6SXA 8

James, K6SXA, who already held USA-CA-500, won his USA-CA-1000 gold endorsement seal to become number 8 holding this class. Of the 10 awards, 7 were for mixed operation; CO8JK's was phone, SM7ID's was all 21 mc c.w., and ZL4CK's was all 14 mc c.w. W3TKQ is the Philmont Mobile Radio Club, Franklin Institute, Philadelphia, Pa., which emphasizes clubs may win USA-CA. Karl, SM7ID, writes he has 760 counties toward USA-CA-1000.

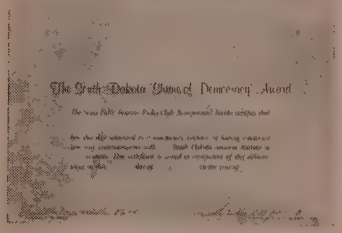
We Get Letters and Questions

DL5DQ, Robert: "It's hard to find the words to thank you for the excellent USA-CA Program. The personal satisfaction it brings is more than you may realize. Being in the USAF and frequently moving, it is most enjoyable that at last hamdom has a significant awards program that does not ridiculously strip one of accrued contacts and QSLs simply because in serving one's country we cannot maintain permanent residence. I have always been an avid DXer; with the advent of USA-CA and the other awards it so generously and altruistically supports, I now have become an avid awards hunter."

K7GTK, Rod: ". . . was highly pleased to receive the unusually beautiful USA-CA. Thanks to your able 'quarterbacking' I and others in the Armed Service have a stimulating and broad awards program we can enjoy with continuity over the years regardless of where we may be sent for duty. While in Idaho I helped many get 'rare' counties. We now are stationed at Castle A.F.B., California." *(OLD MAN's* NOTE: Rod, an A.F. Doctor, is just one of scores who have written their appreciation that the USA-CA Program imposes no restrictions as to dates or calls held or changes of QTH).

William Schultz, (Staff Newark News Radio Club): "Clif, at our Board meeting last Saturday, President Irv Potts turned over to me the courtesy *Directory of Certificates* you had sent him. Clif, I have been with NNRC for seven years. While I have no way of knowing what may have gone on in the past, I can honestly say that never have I seen anything in our published matter or club activities, detrimental to any other organization . . . either ham or SWL. Our main interests are to promote friendship within our own group and with other groups and to help each member, no matter what phase of the various hobbies he may be interested in. Thanks for your kind remarks about the NNRC, and in addition, this letter brings with it the thanks of President Potts and the entire Board of Directors of the NNRC."

W9UXO, Frank: "Your articles in *CQ* are tops. Heretofore I had been just a DX 'hound'; however, I now realize I had been missing out on unlimited fun. My logs now show a predominance of stateside QSOs and CHCer contacts. Thanks for two exciting programs that are really satisfying."
W6MDK, Bob: "First, let me say your USA-CA column in *CQ* is the best ever . . . thousands the world over appreciate your efforts to spotlight that the final courtesy of a QSO is a QSL. Let me say that CHCers are top QSLers. Sent 152 QSLs for contacts in the CHC/HTH QSO Party and received 148 in return. In contrast, for ARRL Field Day, sent 44 and received only 12 in return. This, of course, can only reflect the wonderful ham spirit of the CHCers and associated HTHers, and those you are able to reach through your writings. Your forces are growing . . . keep after them."
KH6BLX, Clyde: ". . . sure do admire the successful work you are doing in many areas to simplify acceptable certification systems in application for awards. The demand by some sponsors that precious QSL cards must be sent has been one of the big drawbacks plaguing most hunters . . . suppose this unreasonable demand will be with us for some time, even with many DX awards sponsors, so long as ARRL continues to demand cards be sent in lieu of some reasonable certification system. Please send me the calls of five deserving DXers you feel will appreciate gifts of your *Directory of Certificates*." (NOTE: K6BX sends such gift *Directories* postpaid for only $2).
S.W.L., Richard Little, Texas: "The USA-CA is one beautiful award which I shall one day possess. I will be proud to help any DXer ham or s.w.l.er identify U. S. counties. How can s.w.l.s make their reports to hams more meaningful? (OLD MAN's NOTE: S.w.l.s should send reports the same as though they were hams. Such reports include GMT time/date, band/mode used, signal report, and name both parties of the contact monitored. We suggest s.w.l.s not make reports when only hearing a station calling *CQ*. While it might not be possible to hear both parties, both parties should be identified. We suggest s.w.l.s write personal notes stating any unusual circumstances of band activity etc., and that it be stated to the ham that his QSL is needed for named awards. Many hams will not QSL to s.w.l.s unless s.a.s.e. is sent because most hams do not get any real benefit from s.w.l. reports other than the fraternal exchange generated.)



One of the purposes of the South Dakota counties awards is to publicize Mount Rushmore National Memorial which portrays four giants of American history carved majestically in granite in proportions symbolizing their greatness. On the grante face of 6,000-foot high Mount Rushmore in the Black Hills, the likeness of four great Americans have been sculptured. Gutzon Borglum sculptured the models and directed the work. The heads are in the proportion of men 465 feet high. Each head is twice as high as the head of the great Sphinx of Egypt. A great program, which while promoting amateur radio interests, also promotes a free society's freedoms which succors and sponsors amateur radio privileges.

Governor Archie Gubbrud of South Dakota signing the first South Dakota "Shrine of Democracy Award." Number one went to Loucille Wardell, WØWEN, standing immediately behind the Governor. On the left is Bonnie Nichols, WAØBGD. This award was sponsored and signed jointly by the Sioux Falls Radio Club and the Governor; see text.

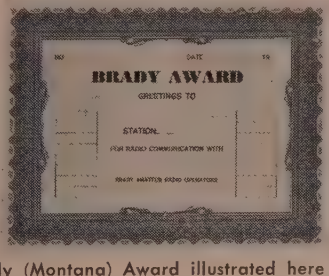
K4ZRA, Dan: "Thanks for the wonderful coverage of Kentucky's Bluegrass awards. It is a revelation and real service to hamdom that finally a ham magazine so generously supports other than their own internal awards. *CQ* is to be congratulated for this manifested free-press policy. . . . Clif, a suggestion: would it not greatly facilitate identification and stimulate greater interest if those who are operating either mobile, portable or fixed from recognized 'rare' counties, gave a general call of 'CQ CA.' In many cases advance publicity is impossible and this would insure reasonable success for most all county expeditions?"
G2FFO, Dick: ". . . recently purchased copy POD #26 and find I already have 450 U.S. counties confirmed. Have written *CQ* for Record Books. Please add me to the USA-CA Good Will Club to help Europeans identify U.S. counties." (OLD MAN's NOTE: Those who avail themselves of such services should provide courtesy of s.a.s.e. Have received word that some folks asking for such service send only calls. Common courtesy demands that city and state named on QSLs be listed in such format manner that Good Will Club members need only to add name of county to lists.)
W8GZF, ex-KL7CAW, John: ". . . know you are one busy man and don't expect an answer to this note of encouragement. When I first heard about

This is the All States Award—RTTY, sponsored by *The RTTY Bulletin*, for contacting stations in all U.S. states by two-way RTTY. Apply to the Editor, P.O. Box 6047, Daytona Beach, Florida.

Ralph, K5ZQZ who constantly travels throughout Louisiana and Mississippi has been making many county hunters happy through his 'unusual' cooperation. Several have reported Ralph has driven off the beaten track for 10 or more miles just to help some hunter get that nearby 'rare' county. Ralph illustrates what we have been saying all along: mobiling, portable or Field day operations can be tremendously more exciting if one joins "USA-CA Fun Unlimited."

your many programs I thought you must be a real nut to devote so much of your time serving hamdom, and I *suspected* commercial interests. I want you to know I have closely followed your activities and my opinions have changed. I now have considerable respect for what you are doing for our hobby. In the 12 years I have been a ham I have noted many things I and others have felt are SNAFU. Heading the list, is the thinking of some sponsors on the ridiculous requirement that one must forever reside at the same QTH or else QSLs are worthless. For the past 12 years I have operated in Kentucky and Texas in five different locations; in Alaska, and now in Michigan with three different QTHs. I missed WAS three times by less than 4 states before I finally got it. I missed WAC in Alaska by one contact. In these modern times of both world communications and world travel by a majority of hams, why are we still tied to sparkday concepts that QSOs must be from a certain location or within a radius of 25 miles or so? What 'value' does this restriction place on any award?"

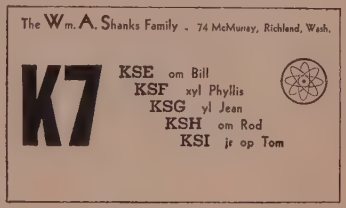
XE2DS/XE2PDS, Kem: ". . . thanks for USA-CA-500, the most beautiful of all awards. We are sending a photostatic copy to Mexican Radio League, LMRE. They are now stressing participation in certificate hunting and I hope other XE's will be fortunate enough to win the USA-CA. Please stress



The Brady (Montana) Award illustrated here is sponsored by the Amateurs of Brady for working Brady stations. U.S. stations work 7; others 55. Custodian is W7TGG, Vera Woods, but you may send full log data list to any Brady ham. No charge. Brady hams include: W7IHX, QAK, QCP, SFK, SZY, TDW, TGG, THP, VDT, VHA, VDU, K7AJQ. The blocks pictured on the award are for naming stations worked.

for U.S. hams to keep plugging for passage of Reciprocal Licensing Bill . . . ask them to write Senator Barry Goldwater and other Senators and Representatives. We are enjoying here, as Americans, a privilege denied many hams." (OLD MAN's NOTE: Present Reciprocal License Bills died when the Congress headed home to mend fences for re-election. It is now required that *new* Reciprocal License Bills be sponsored and submitted to the Congress. Such matters do not just happen; they require considerable mass pressures from citizens, hams or otherwise. A completely new campaign must be waged with the new incoming Congress).

K3TEM, Bob: ". . . your column and words of timely wisdom on many hamdom problems are outstanding. Any ham who just reads the house organ may get some 'inside League dope' but unless he partakes of *CQ* and other free press, he just doesn't know his upper lip from third base about the real issues." (OLD MAN's comment: Your earthy words are well planted. We suggest all U.S. hams subscribe to the League's house organ, *QST*, but also subscribe to CQ and several other free press journals and News Letters which objectively publish more unbiased news representing several sides of hamdom's many problems).



Here is the QSL card of the Wm. A. Shanks family, Richland, Washington. There are two unusual features besides the fact that five members are licensed hams . . . their calls run consecutively. In November issue CQ we gave your data on the Atomic Smashers' award for working Richland amateurs . . . imagine 'bagging' five of them under one roof!

South Dakota Joins USA-CA Parade

As we flashed in earlier issues, South Dakota was about ready to make a big splash with a county awards program. Here it is and what a beautiful program! When Lou and Clayton, WØWEN/WEM were here in Bonita visiting the OLD MAN, we got the advance lowdown on these wonderful folks' plans to put the state of South Dakota in the limelight of world-wide good public relations. See picture of award. See picture of South Dakota Governor signing first award.

As pictured, the South Dakota Shrine of Democracy Award by Sioux Falls Radio Club for contacts after January 1, 1960, as follows: A) *For state of So. Dakota residents;* work 15 counties and 3 Sioux Falls Radio Club members (one member to count as Minnehaha County). B) For state of So. Dakota; 20 counties and 3 club members. A) *Other U.S. states;* 15 So. Dakota contacts, 3 of which must be Sioux Falls club members and must include 5 counties of which one can count as Minnehaha County. B) Other U.S. states; 25 contacts including 3 Sioux Falls members and 8 counties. A) *DX; plus Alaska and Hawaii;* 5 So. Dakota contacts including one Sioux Falls club member. B) DX as above; 8 contacts including 3 Sioux Falls Club members.

Application; Send certified (GCR) list with complete log data (no QSLs to be sent) and $1 or 10

Pictured above is the B. & O. A.R.C. certificate for working club members in several states. Here is an example of the hams in a major industry joining together through establishing a club with regular net schedules. See text for story of new revised rules for the club's award.

IRC to Custodian, KØWEM or KØWEN, Clayton or Lucille Wardell, 1306 Sunset Dr., Sioux Falls, So. Dakota.

As the OLD MAN has repeatedly stated, there is no better public relations vehicle than a high-level and significant awards program sponsored at local club level but designed to promote one's state and all hams within such state. The South Dakota award is a classic example of a 'good' awards program.

North Dakota Joins "USA-CA Fun Unlimited"

The North Dakota State University Amateur Radio Society announces preliminary plans for sponsoring a North Dakota State Counties Awards program and joining USA-CA fun unlimited.

North Dakota always has been a rare ham state because less than half of the state's counties have active amateurs. As a result, and to be realistic, the new award will be issued in four classes, each a separate achievement as endorsed on the basic certificate by use of 2" gold seals bearing the official NDSU imprint seal.

As we write this, complete details have not been resolved; however, the following gives general expectations. Award requirements for working counties are: CLASS C, work 10/5 with latter figure applicable to DX stations. CLASS B is 25/15; CLASS A is 40/30, and CLASS AA is 53/53. It is planned a special North Dakota state flag will be given to winners of Class AA. The President of North Dakota State University will co-sign the awards.

County identity will follow USA-CA rules. There are no restrictions as to dates of contracts or calls held. Award is available to s.w.l.s. To get the award, send certified (GCR) list showing supporting data for band/mode endorsements claimed plus names of cities or QTH for verification of counties, together with handling fee of $1 or 10 IRC, to North Dakota State University Amateur Radio Society, WØHSC, c/o NDS-CA Custodian, E.E. Dept., Fargo, North Dakota.

The NDSU group are also planning an annual North Dakota QSO Party to help those seeking the award and to activate many rare counties. The group also will hold its second annual Hamfest this Spring. Other plans include working on a 144 mc Moonbounce program.

Further planned activities of the NDSU group is for the club station to join CHC. They also plan on winning USA-CA-500 and already have 450 counties confirmed.

While the certificate for the counties award is still in design stage, it is believed it will have an unusual and attractive outer border made up by pictures of famous cattle brands. It is possible the certificate background will picture the state capital. Rules are expected to adhere to Directory of Certificate's recommended procedures for requirements and handling. Phillip C. Schloss who has been carrying the ramrod on the NDS-CA Committee states the club is preparing mimeographed copies of rules available upon request. We suggest those interested shoot along s.a.s.e. request and also to suggest to the group which of the rare counties are in greatest demand.

As the OLD MAN has repeatedly stated, a club can find no better media of publicity and public relations than a realistic, high-level awards program which promotes one's state, counties, cities, institutions and citizens be they hams or otherwise. The NDS-CA Program is concrete evidence of what can be done by a forward thinking and energetic group. Their action alone will insure that forever more, North Dakota and North Dakota hams will obtain bettered local, national and international recognition.

More on North Dakota

It seems our recently published tabulation of awards vehicles in use by various states, shook up a few clubs in those states lacking any awards programs whatever. We have advance information the Grand Forks Amateur Radio Club, North Dakota, will soon announce an awards program. We will keep you advised as the situation develops.

Montana In Awards' Limelight

Montana may have few radio amateurs and many rare counties; however, Montana hams recognize and implement advantages to them and state through highly supported awards programs. (42nd in U.S. population).

This issue we bring you pictures of all four Montana awards now listed, thanks to Roy, W7RZY. Operational requirements to achieve each of these awards is given in picture captions.

Montana calls its county award the Treasure State Award. Montana truly is a treasure state. Montana has 11 National Forests, 23 State Parks and 47 Game Preserves. Several areas have yielded ancient mammals, primates and dinosaurs, including skeletons of huge *Tryannosaurus, Triceratops* and *Stegosaurus*. Montana is noted as a mining, cattle and tourism state. Annual mineral production, with emphasis on copper, exceeds $175,000,000. Over 2,150,000 cattle and 1,700,000 sheep graze Montana's mountain pastures. Montana truly is one of

[*Continued on page 117*]

Shown here is the Harlo (Montana) Radio Club award for working club members after July 1, 1959. Montana hams work 5 members; other U.S. stations work 3, and DX stations work 2. Apply to club, c/o K7IUJ, with certified (GCR) list. DX stations no charge; U.S. stations send 25¢ handling fee. Members are: K7CHA, IUJ, LMW, LUC, W7CTM, MBV, RZY, SZB, TGL, TGM, TRU and YTG. Holders of the Harlo award become honorary members of the club.

sideband sideband sideband

SIDEBAND

IRV & DOROTHY STRAUBER*, K2HEA/K2MGE

SSB DX HONOR ROLL

TI2HP	276	W5AFX	250	W6WNE	232
W8EAP	272	K2MGE	246	G8KS	231
VQ4ERR	271	W3MAC	243	K1IXG	230
W8PQQ	271	W3LMA	242	WØUUV	230
W2ZX	270	W1LLF	242	WØCVU	230
PY4T	267	W3KT	241	I1AMU	229
HB9TL	264	PZ1AX	240	W2TP	227
W2FXN	260	W6PXH	239	K6ZXW	226
W6UOU	260	W2JXH	237	K1EJO	226
W3NKM	259	W6BAF	237	G3FKM	226
WØQVZ	255	W5IYU	237	G2BVN	225
K4TJL	254	DL1IN	236	W2YBO	225
K8RTW	253	W2VCZ	235	K6MLS	222
K9EAB	250	G3NUG	235	W1AOL	220
MPBBW	250	W8YBZ	235	UA3CR	217
W4OPM	250	W1OOS	234	K4PUS	215
G3AWZ	250	W6RKP	234		

CQ SSB ENDORSEMENTS AND CERTIFICATES

W3KT	225	W6HYG	175	WØLBB	100
W2YBO	225	W6HYG	150	K5YYI	100
WØPGI	200	WØLBB	125	K4LYG/7	75
W3CGS	200	DL1PM	125	W4UF	75
WA6EYP	200	W6HYG	125	K9PNV	50
W6HYG	200	K4LYG/7	100	K6AMA	50
WA2IZS	200	VQ2AT	100	K4LYG/7	50
				K2IQP	50

Seventh Annual CQ World Wide Single Sideband Contest

March 30 to March 31, 1963

I. Contest Period: 1200 GMT, Saturday, March 30, to 1800, GMT, Sunday, March 31, 1963 *with only 24 hours of operating permitted.* The six hours of non-operation must be consecutive—at the beginning, end, or any six hours during the middle of the Contest—and must be clearly designated in the Contest log. Contestants may, of course, operate less than 24 hours if desired, but must show a minimum of 100 contacts if they wish to be considered eligible for an award. Logs not indicating a 6 hour rest period will be disqualified!

II. Participation and Bands: The Contest is open to all sidebanders in all parts of the world and all authorized amateur frequencies may be used. Only one transmitter may be in operation from any station at any one time and *only the licensee of the station may operate* (except at a club station where one duly-designated club member may operate at any one time).

III. Object: The object of the Contest is to work as many stations and as many different prefixes on two-way single sideband in the world as possible. (A "prefix" is considered the two or three letter/numeral combination which forms the first part of any amateur call. The following would all be considered *different* prefixes: W2, K2, WA2, WB2, WA6, 5A1, 5A2, DJ1, DJ2 DL2, *etc.*) Each different prefix may only be counted once during the Contest!

The *same* station may be worked *once* on *each* band (1.8, 3.7, 7.2, 14, 21, and 28 mc) for purposes of accumulating points and, therefore, separate log sheets for each band must be submitted. For example, if you work G8KS on 20 meters, you may also work him again on 10, 15, 50, 80, and 160 meters, adding the proper points each time. However, once you have counted the G8 prefix on one band, you cannot count it again.

IV. Serial Numbers: The Contest exchange shall consist of the usual Q- and S-report, followed by a three-digit serial number of the contact. For example, the first contact might be 59001; the 89th contact would be 59089, *etc.*

V. Points: 1. For stations outside the USA:

a. Contacts with stations in different countries but on your own continent will count 1 point each on 10, 15, and 20 meters; 4 points each on 40 and 80 meters.

b. Contacts with stations in different countries on different continents will count 3 points each on 10, 15, and 20 meters; 6 points each on 40 and 80 meters.

2. For USA stations:

a. Contacts with stations in different countries but on your own continent will count 2 points each

Here is the K6MLS Trophy which will be awarded to the first sidebander to submit proof of contact with 300 countries on two-way sideband. Will it have your name engraved on it?

*12 Elm St., Lynbrook, New York.

Someday we'll have a contest and publish unidentified photos to see if you can link the voice with the face. But no suspense this month—this is Dennis Bowden, DL2AB, who is serving with the British Forces in Germany and who has become a very popular sideband during the past year. *(Photo courtesy of W3HQO)*

on 10, 15, and 20 meters; 2 points each on 40 and 80 meters.

b. Contacts with stations in different countries on different continents will count 2 points each on 10, 15, and 20 meters; 4 points each on 40 and 80 meters.

3. Contacts between stations in the same country will be permitted for the purpose of gaining a prefix multiplier but no points can be credited. (In other words, USA stations, for example, cannot count other W/K/WA/WB stations for points but they may work these other stations for the different prefixes in use in this country.) (For purposes of this Contest, Alaska, KL7, and Hawaii, KH6, count as separate countries; Alaska is on the North American Continent and Hawaii is in Oceania.)

VI. Scoring: 1. The score of each single band will be the sum of the different prefixes worked multiplied by the total contact points for that band.

2. The total all band score will be the sum of the different prefixes worked on all bands multiplied by the sum of the contact points on all bands.

3. Those sending in logs for a single band will be eligible for a single band award only. If a log is sent in for more than one band, indicate which band is to be judged, otherwise it will be judged as an all band entry.

4. A station will not be eligible for more than one award.

VII. Awards: Certificates will be awarded as follows:

1. To the highest scoring station on each single band in the following areas:

(a) Each call area of the United States, Canada, and Australia.

(b) All other countries.

2. To the highest scoring station operating on more than one band in the following areas:

(a) Each call area of the United States, Canada, and Australia.

(b) All other countries.

VIII. Special Awards: In addition, the following special awards will be made:

1. A cup will be awarded to the highest scoring station, using more than one band, in the world. *(The K2HEA-K2MGE Trophy).*

2. A cup will be awarded to the highest scoring multi-band station in the U.S.A. *(The W2SKE Trophy).*

3. A cup will be awarded to the highest scoring station using single band outside of the USA *(Donor to be announced).*

4. A cup will be awarded to the highest scoring U.S.A. multi-band station using under 175 watts p.e.p. *(The W8YIN Memorial Trophy).*

5. A cup will be awarded to the highest scoring non-U.S.A. multi-band station using under 175 watts p.e.p. *(Donor to be announced).*

IX: Disqualification: Violation of the rules and regulations pertaining to amateur radio in the country of the contestant or the rules of this Contest will be deemed sufficient cause for disqualification.

X. Log Instructions: 1. In keeping a log, indicate a prefix only the *first* time it is contacted.

2. Use a separate sheet for each band and a tally sheet or report form.

3. All times indicated must be in GMT.

4. All contestants are expected to compute their own scores. Logs should be checked for contact and prefix duplication and proper point credit before they are submitted.

5. Make sure name and address are clearly noted on each log. PRINT or TYPE!

6. Prefix check lists (obtainable from the *CQ* SIDEBAND editors) must accompany each log.

7. Log sheets, report forms, and prefix check lists are available from the *CQ* SIDEBAND Editors, 12 Elm Street, Lynbrook, New York. Send a self-addressed envelope, large size with double postage for either surface or air mail. Log sheets, report forms, and prefix check lists are also available in the U.K. from G2BVN; in Australia from VK2AQJ; in the Orient from JA1ANG; and in Africa from ZS6AMV. S.A.S.E. also required.

XI. Rules Changes: 1. Separate point scoring for U.S.A. and overseas stations (Sec. V.)

2. Awards to single and multi-band operators (Sec. VII).

3. Mandatory prefix check lists (Sec. X, #6,7).

XII. Deadline: All logs must be returned *directly* to the *CQ* SIDEBAND Editors, 12 Elm Street, Lynbrook, New York, to be received no later than June 15, 1963.

"Worked 300" Trophies Offered

Dr. George Stauch, K6MLS, of Sacramento, California, a well-known and ardent sideband DXer, is the donor of three unique trophies to be awarded to the first three stations in the world who submit evidence of confirmation of two-way sideband contacts with 300 countries. The top trophy is shown in the photo and is a fitting tribute to the superior operating technique of the operator who first submits sufficient confirmations to earn the "Worked 300" Award. The other two trophies will be shown in a future column.

In the interests of fairness and sufficient time to permit the announcement of these awards to reach sidebanders all over the world, claims for the K6MLS trophies will not be accepted until March 1, 1963. After that date, the first three applications, according to postmark, accompanied by the neces-

[*Continued on page 120*]

The call of K2GXI is famous on 40 meters where its owner, Bob Sommerfelt, of Buffalo, New York, was the first to work over 50 countries on two-way sideband. Bob and his fine station are shown above.

HAM CLINIC

CHARLES J. SCHAUERS*, W4VZO

THERE are still many worthwhile pieces of surplus radio equipment on the market which can be modified for ham-band use. Also to be found are surplus instrument items, component parts and a large number of odd-ball sets—from telemetering to interphones. However, it now takes a lot more effort to find the real good items than it did five years ago.

Buying surplus can be rewarding as well as heartbreaking. Some hams have found out the hard dollar way that some bargains are not bargains at all—because many items cannot be converted practically or economically for ham use.

I have stated before and repeat again, *do not* buy surplus items unless you know that they can be converted. If you are buying a piece of equipment solely for the parts it contains, make sure that the parts are usable.

During the last 17 years, many technically qualified hams have converted surplus items with great success, and have written up their efforts for publication. So before buying an item be sure to check back issues of magazines available to you.

Here are some of the items which are still available on the surplus market which I feel are worthwhile to buy and convert for ham use. In some cases, the prices are higher than they were five years ago, but they are still real solid bargains.

Space precludes listing information and conversion sources, but if you will write to HAM CLINIC we will be glad to give you the necessary references.

APA-38 Panadaptor; ARC-4 Radio Set; ARC-5 Command Sets; ART-13 Trans.; TRC-8 Radio Set; BC-221 Freq. Meter; BC-348 Receiver; BC-604 Trans.; BC-610 Trans.; BC-669 Radio Set; BC-779 Receiver; RCA MI-7800 Trans.; BC-696-A Trans.; CRV-59AAE TV Camera; FL-5 and FL-8 Filters; GF-11 Trans.; I-177 Tube Tester (Adapter); ID-11/APS-4 and ID-60/-APG-15 Scope Indicators; Prop Pitch Motors; TCS Trans.; T-17 Mic.; TBY Trans.-Receiver; SCR-522; and BC-1158.

There are many, many more items, but if you can obtain any of the items mentioned above, there is a lot of information available on each and every one.

If you happen to be a ham who has purchased a new release surplus item and have converted it to ham use, we would like to hear about it.

Questions

Super-Pro for S.S.B.—"Where can I obtain information relative to the conversion of my old Super-pro receiver for good s.s.b. reception?"

See *CQ* for Sept. 1958. It contains the best article I've seen on converting the "Pro" for s.s.b. reception.

S.S.B. vs. F.M.—"Does s.s.b. have any advantages over f.m.? If so, what are they?"

First, f.m. takes more frequency space (more band width). Second, the performance of s.s.b. on weak signals is better than f.m. Last but not least, f.m. cannot be received properly on an ordinary a.m.-c.w. receiver—s.s.b. can—by using the b.f.o. to inject carrier.

A.F. Intermittent—"When I turn up the a.f. gain on my receiver it seems to cut off. Sounds like the speaker connection is made and broken. But everything checks okay. What gives here?"

Could be an intermittently open output transformer or speaker voice coil.

Direct Probe—"I recently bought a scope and note in the instrument book that there are two probes available for the set. One is a direct probe and the other is an isolation probe. What is the difference?"

The direct probe is just that—a test probe which is connected to a piece of shielded cable without series resistance or capacitance. The isolation probe can be either capacitive or resistive or both and serves to present a higher impedance, a lower capacitance or higher resistance to the load (the scope and/or circuit).

Tube Shorting—"About every two months I have to replace the final tube (807W) in my mobile transmitter, because it shorts out. What can cause this?"

Vibration plus heat. Suggest you either shock mount the transmitter or the final tube socket and provide more ventilation.

CB to Ham Band Conversion Trouble—"I converted my c.b. transmitter from 27 mc to 10 meters. All I did was change the crystal and add a final coil with fewer turns. I got a citation for out-of-band operation. Any hints?"

How far out of band? Harmonic? Suggest you check doubling circuits and oscillator operation first. Then

*c/o *CQ*, 300 W. 43 St., New York 36, N. Y.

check the final for harmonics. Let me know the frequency you were "clocked" at and I may be able to help you further.

DX-40 Modulation—"I just got my General license and bought a second hand DX-40. The reports I get are that the modulation is bad and distorted. I've tried reducing loading but this did not help. Can you assist me please?"

Sure. First install an a.f. gain control on the good little workhorse—see the July 1961 issue of *CQ*, page 77. Also see page 78 of the April 1961 *CQ*. For screen modulation, the load should be as heavy as technically and practically possible.

Saltwater in Equipment—"I dropped my receiver from my boat into the Atlantic Ocean (accidentally) while carrying it aboard. I dried it out good but it sure does not work as it did before. What can I do?"

First, hose it out good with clear plain water. Clean out salt crystals from tuning gang plates with a pipe cleaner. Then blow excess moisture out of the set with compressed air. Put it in an oven at *very low* heat and "bake" for about three hours. Check alignment. If the set has an S-meter, it is wise to *remove* it before doing the above. After the set is dry, also check for residue salt crystals between terminals. Good luck.

Mercury Batteries Exploding—"I use mercury batteries in my transistorized equipment for long life and constant voltage output. The other day two of these batteries were tossed into the incinerator by one of my kids. The batteries of course exploded. Would you please tell your HAM CLINIC readers about this so that they will not allow this to happen around their homes?"

Sure will, and thanks a million. Also, *do not* throw empty spray cans in the incinerator either.

DX-60 and SB-10—"Can I use the DX-60 with the SB-10? If so, how? I cannot seem to get any information on the combination from anyone who has actually tried out the two. Can you help?"

Yes, the DX-60 can be used with the SB-10. However, the SB-10 must have its own power supply as shown in the instruction book. The conversion of the final is the same as it is for the DX-40, but the neutralizing stub should be removed for s.s.b. work. By the time this is in print, the Heath Co may have detailed information on using the DX-60 with the SB-10, and you should write them; for they do not recemmend changes which do not work.

The bias supply used in the DX-60 can be used for the final converted for AB-1 operation. A little more than half (about 50 volts) of the available bias is all that is needed. This can be obtained through a dropping resistor. Stabilization of the screen voltage of the 6146 at 300 volts is of course accomplished with series v.r. tubes.

Switching is another matter. You will have to add your own switching arrangement. I suggest the use of a multiple pole ceramic switch for switching the following: screen voltage; r.f. input to the final from the 6CL6 and to the SB-10; bias; and maybe even the neutralizing stub.

Tower Obstacle Light—"Although I am not required to have a flashing red-light on my 70 foot tower, I would like to install one. I do not want to run an a.c. line. Can you help me?"

Try the scheme in fig. 1. You can run the two switch wires to the base of the tower so that you can turn the device on and off. The light will flash about 75 times per minute. You can change the flashing period by changing the 15 mf capacitor.

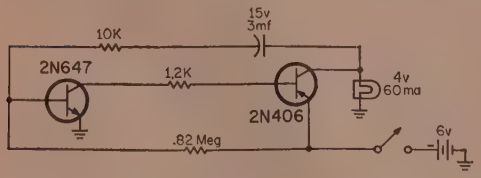


Fig. 1—Simple, low power flashing beacon for use atop an antenna tower. With values shown the rate is approximately 75 flashes per minute.

Portable vs. Mobile—"When traveling cross-country I have been tempted at times to connect my mobile rig to a fence wire to get out better. If I do this, what am I, fixed or mobile?"

You are still mobile. When you take that set out of the car and operate it from the confines of a tourist court or motel, you're *fixed* and you are *portable*.

Commercial Radio Info—Although we have said this before, we must say it again. We do *not*, via HAM CLINIC, answer queries from non-ham technicians and engineers relative to commercial communications-electronics problems. This means that if the problem submitted to us has nothing to do with ham radio (or ham life) we do not answer. HAM CLINIC *service* is exclusively for hams or hams-to-be and deals only with ham radio problems.

TR Switch Modification for 6 Meters—"I own a commercially made antenna T-R switch. This switch has a broad-banded coil in its output but is only good down to 10 meters. Anything I can do to make it work on 6 meters?"

You can tap down on the coil and add a ceramic switch for 6 meters, or install the combination external to the switch. If you are worrying about gain, you won't get much of it on 6 meters anyway with *any* TR switch; but a little is better than none.

21 Mc TVI—"My dad brought home an old TV set that has a 21 mc i.f. Is there anything I can do to keep my 15 meter signals out of this set he so proudly watches in his den?"

You can have a good TV serviceman try shifting the i.f., changing the local oscillator frequency and also the frequency passband of the i.f. Then by adding a good highpass filter, you *might* be able to avoid TV'ing your dad's set. But these measures do not always work when the ham signal is strong.

Electro-static H.V. Noise—"My neighbor installed a high voltage type dust filter in his air conditioning-heating system. This is the type of gadget that creates a high voltage which is applied to a screen to attract dust, *etc*. Well, since he put it in I can't use my receiver on *any* frequency—just too much noise. I've told him but he just shrugs off my complaint. Now what?"

If that electro-static type unit was installed improperly it could create noise; or if it has a defective filter component. Heavy arc-over will also create the noise. If it bothers your receiver it must bother his TV and BC sets too. Call your power company (anti-noise department!).

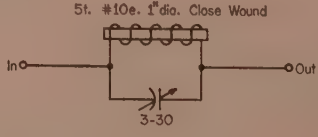


Fig. 2—Generator hash filter for 6 meters. Inserted in series with the generator field and tuned to 50 mc it will effectively suppress most generator noise.

6 Meter Hash Trap (Mobile)—"Give me the circuit and construction information on a generator hash trap for 6 meters. My car generator is full of hash."

Before you install the filter shown in fig. 2, make sure that the brushes in your generator are riding properly on the commutator and that the commutator is clean.

Thirty

HAM CLINIC wishes all of its readers a very happy and prosperous New Year. We will make no predictions for this new year, but we promise to do our best to bring you the information on amateur radio that will make our hobby more enjoyable.

73 and 75 Chuck, W4VZO/HB9

VHF

DONALD L. STONER*, W6TNS

THIS is being written in—of all places—Tegucigalpa, the capital city of the country of Honduras. Undoubtedly it ranks as one of the most beautiful countries of the world. Everything is a lush green and so unlike California where we must buy the plants and flowers which nature provides and takes care of here for free. It's also a fine country for a DX-pedition, but more about that later.

The events leading up to the trip were so hurried that I had no time to look up the QTH's of my many ham friends who I wanted to visit in Central America. However, hams being what they are, I had the good fortune to make the acquaintance of many new friends such as Bill Lady, HR1BL, Charlie Mathews, HR1CM, Audulio Ricketts, HR1RM, Frank Turton, G2ZU and VP1ZU of "Tagoose", plus Hal Hallar, HR3HH up in La Ceba.

Honduras is not a country conducive to v.h.f. work. Almost every village and town is separated from each other by hills and mountains. Thus communications are primarily carried out on the h.f. bands. Since the topography of other Central American countries is similar, the communications explosion on the h.f. bands makes the crowding there almost chaotic. By comparison, the novice bands on a Sunday afternoon seem almost vacant!

One of the first steps to relieve this congestion has been taken by Tom Ball, HR1LB of the Civil Aviation Assistance Group working with the Honduran metrological service. Tom is currently installing v.h.f. equipment operating between 45 and 50 mc which will eventually link the larger airports in the capital city of each Central American country. The purpose of the network is to dispatch aircraft operating within the borders of these countries.

In practice, the major airports are linked to v.h.f. relay equipment on "high sites", located near the city. The link is duplexed on 453.25 and 460.25 mc. The link is relayed to the next "high site" on frequencies between 45 and 50 mc.

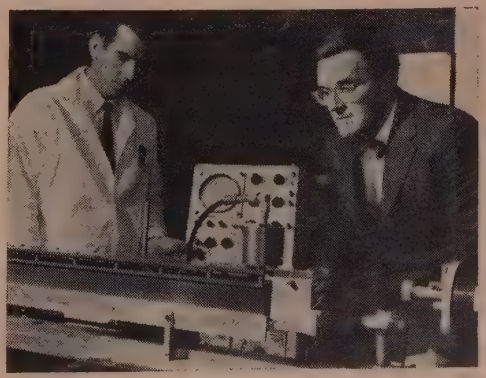
During a business trip to Coyoles, I spotted a six meter Communicator Three which Standard Fruit had tried to use for communications between Coyoles and the administration offices in La Ceba. Standard Fruit, by the way, is one of the largest banana producers in the world. Standards' experiment on six meters was unsuccessful primarily due to the presence of an 8,000 foot mountain range in the way. The six meter gear was relegated to the scrap heap. By cajoling and promises to eat only Standard bananas, the rig was loaned to me for several days.

Investigation showed that the crystal (the only crystal!) was cut for 50.7 mc. and from past experience I knew few DX'ers would find me at that spot. However, I reasoned if I could snag one lonesome fellow up there he would spread the word and yours truly would be in business.

There was no opportunity to use the gear up in La Ceba because of business commitments. However, upon returning to Tegucigalpa we spent the evening at the home of gracious Charlie Mathews, HR1CM. A check of 10 meters showed it was wide open to the states.

We hastily erected a simple dipole for 50 mc. My sidekick, Hugh Cover, WA6EJI, held the coax in the connector while I anxiously fired up the rig. In the commercial band an oil drilling rig near Brownsville and the Dallas police department were positively identified. Up in the ham band we heard short bursts of weak watery signals with Texas and Carolina accents but no call letters could be positively identified. Call after call netted no replys and by eight in the evening we retired to drown our sorrows and toast to a better band opening.

Obviously the antenna system left something



General Telephone scientists and their wideband laser modulator.

*Alta Loma, California.

to be desired. Recognizing our plight, my friend Tom Ball offered the use of his "high site", high gain antenna system. The antenna happened to be a three-stack, 12 wavelength rhombic pointed at San Pedro Sula which also put it smack on Texas! At last it looked like we were really in business. The rhombic is located atop Cerro De Hule, some 8,000 feet high and serves as the Tegucigalpa terminal of the network mentioned earlier. Actual measurements indicated a gain in excess of 20 db at 46 megacycles.

The next morning, bright and early, we loaded in Frank Turton's Volkswagen and started the long trek to the summit of Cerro De Hule. The road, and I use the word very carelessly, consisted of two wheel ruts threading through corn fields, across culverts and in the general direction of up the mountain. After leaving the main road it was simply a test of man and car for some three miles.

At the transmitter site shed everything required for the DX-pedition was available. The remote equipment and transmitters are powered by Onan generators (the primary source of power in remote areas). Frank broke out the English Ale, completely spraying all the equipment, while I proceeded to fire up the gear. Instantly the Communicator sprang to life and signals were heard upon connecting the rhombic. The v.s.w.r. checked less than 2 to 1 on transmit. Unfortunately a check showed the signals were all either spurious from the several local transmitters or short wave stations being heterodyned into the converter due to cross modulation in the r.f. stage. Several CQ's netted zero results and no ham stations were heard.

My hosts took note of the tears forming like huge pools in my eyes and shut down the relay equipment for 20 minutes. This really cleaned up the dial and made it possible to hear actual signals. I noted at least 20 or 30 meteor bursts in a period of 20 minutes but none lasted more than 2 seconds, if that. There was no doubt of the antenna gain—it worked! Mother Nature simply didn't kick through for us. I went for a walk, muttering to myself, and the relay equipment was re-energized.

The trip back down was quick—even with the brakes on—for the "road" was still slick. Farewell to Cerro De Hule.

It was quite a disappointment but good companionship and beautiful scenery helped compensate for not making any contacts from HR-land. By the way I would like to hear from anyone who may have heard HR1BL during the week of October 21 to 27.

Shortly after you read this I will again return to Honduras, this time with a Communicator IV, a v.f.o. and collapsible yagi antenna. The frequencies and times will of necessity have to be circulated over the air since I will have only short notice. If the band is in good shape I may also be able to operate from Guatemala, Nicaragua, Costa Rica and El Salvador. Here's hopin'.

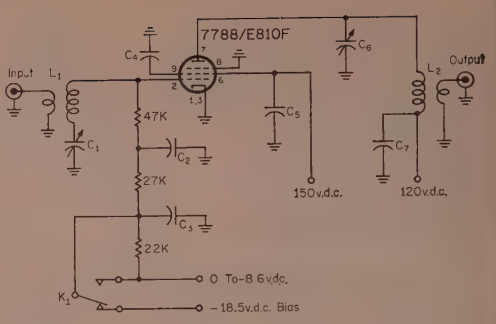


Fig. 1—Two meter preamp using the new Amperex 7788/E810F pentode. Relay contacts K_1 may be extra contacts on the station antenna relay and are used to prevent overload and damage to the tube by the transmitter's r.f.

L_1—7t. #18, ¼" dia. spaced 1 wire dia. with 2 turn link of hookup wire at cold end.
L_2—5t. #18, ¼" dia. spaced 1 wire dia. with 1½ t. link of hookup wire at cold end.
C_1—2-9 mmf variable. Johnson 160-104.
C_2, C_3, C_4, C_5, C_7—0.001 mf button micas.
C_6—3-11 mmf variable. Johnson 160-107.

Let's Get Technical

In the October column a circuit was shown for attenuating signals between a v.h.f. converter and variable i.f. Brian Honess, W4OAB, calls our attention to two errors in the circuit as originally shown in *The Ragchewer*. On the right hand switch section, there should be a 50 ohm resistor between terminals 4 and 5. Also the 50 ohm resistor from 3 and 4 to ground on this section should actually be 100 ohms. If you have your October copy handy why not make the changes now?

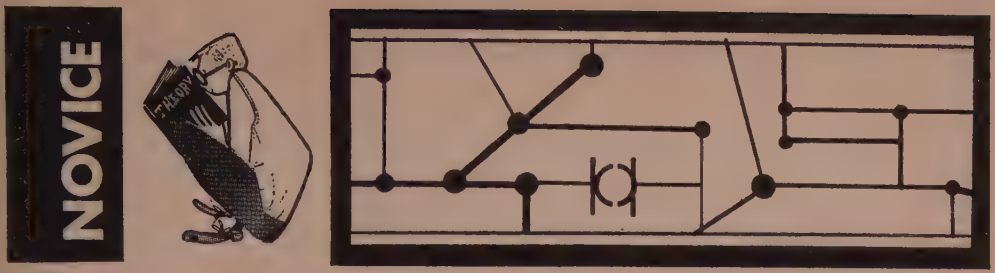
Speaking of *The Ragchewer*, an excellent source of technical and operating news, this months tidbit include a 144 mc preamplifier using the Amperex 7788/E810F, which was designed and built by K4HJE. The circuit is shown in fig. 1. There are several unusual features. Note that the input inductance is series resonated. Also the grid return resistor is heavily decoupled to prevent feedback and the path also contains a blocking bias circuit to prevent damage to the tube when transmitting.

Remember my dissertation on the laser in the November column? Since that time I have received information from RCA on a new laser breakthrough that permits them to use sunlight for the pump source. The new laser permits the direct conversion of natural sunlight into a continuous beam of coherent infrared radiation. This invention makes possible sun powered lasers on board future space satellites which can be used to produce intense light rays for use in communications, tracking and geodetic measurements of the earth. The device uses a calcium fluoride crystal bathed in liquid neon to emit at 2.36 microns when exposed to about 50 watts of "sun power".

One of the problems of using the laser is that of modulation. General Telephone and Electronics has recently developed a wideband laser modulator which has a theoretical capacity of handling simultaneously on one light channel more than 100,000 telephone conversations or 100 television broadcasts! Only 10 watts of modulating power are required.

Quite some time ago *CQ* ran a very popular article series on test equipment. This subject has continued to intrigue amateurs, for without a firm knowledge of test equipment it is difficult or impossible to make construction projects work properly. Larry Klein and Ken Gilmore have just completed a comprehensive handbook on the subject titled *Electronic Test Equipment*. It is not slanted toward the service technician but serves as an excellent course in techniques for the amateur and experimenter. I recommend it as an excellent addition to your library. It's published by John F. Rider.

[*Continued on page 121*]



WALTER G. BURDINE*, W8ZCV

LAST month at the end of the column I wished you a Merry Christmas, and this month, I will repeat Merry Christmas and a happy New Year. Let each of us try to make this the biggest and best year of our life in amateur radio and international good-will. We can make these two goals stride along hand in hand if we watch our operating habits and not do anything to aggravate the tense international situation. Remember, what you say on the air can be heard by any one with a short wave set and once said can never be recalled.

Due to the tense international situation, amateur radio has received considerable publicity and has come to the forefront of emergency comumnications services. Most law enforcement officers have found amateurs willing and able to set up a communication system within their counties. I have found that many officers do not know the difference between the amateur and citizen band operators and the scope of operations afforded by these different services. Did you inform them? Did you help? Can *you* operate from emergency power or do you think you could get ready in a few hours? Try working sometime without an electric soldering iron, a light bulb at the end of a line for light, or power to run the rig. Emergency equipment is of no benefit unless it can be operated *now* without any time to service the power supply, to hookup the receiver, put up an emergency antenna or re-solder that bad connection. It must be ready to go by cranking the engine and throwing the switch, this type of "being ready" can save lives and it could well be your own.

Too many folks are prone to think of an emergency only in terms of war, but we can have any number of communication emergencies. Last winter we had an ice storm that even put our local television and broadcast stations on emergency power. I was able to use my mobile equipment to make contact with Dayton to determine the extent of the storm. We, on the farm had no real emergency except the heating system would not work without the power mains, so, now we are prepared for that contingency. The generators' gas tank is full and I am installing a fifty gallon drum for gasoline. A transistor radio set is included in the same emergency set up, I have it hooked to a type 1 storage battery that is charged every two weeks and would likely run the set for 6 weeks continuously without running down. Are you prepared?

*R.F.D. 3, Waynesville, Ohio.

Printer's Devil . . . Goof

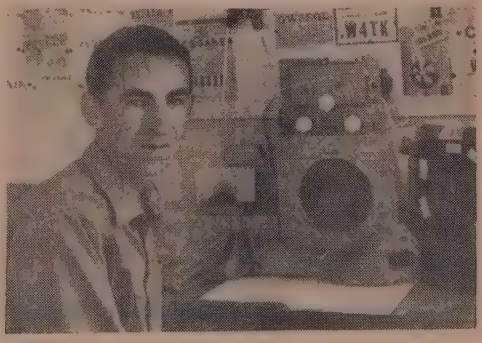
Mike Hill, 577 Bennett Avenue, Penticton, British Columbia says: "I found the code oscillators in the Novice column of October *CQ* of interest but the 6SC7 tube base is numbered wrong."

No, Mike the tube was supposed to be a 6SN7 or a 6SL7 or their 12 volt counterpart. The base diagram is ok but tube type is wrong. Thanks, Mike.

Checking Modulation Percentage

Federal Communications Commission Rules and Regulations sec. 12.133 states in part: "In the case of A3 emission, the amateur transmitter shall not be modulated to the extent that interfering spurious radiation occurs, and in no case shall the emitted carrier wave be amplitude-modulated in excess of 1.0 percent. Means shall be employed to insure that the transmitter is not modulated in excess of its modulation capability for proper technical operation. The frequency of the emitted carrier wave shall be as constant as the state of the art permits."

That is the regulation. Do you comply or do you run the risk of a pink slip from the FCC and the wrath of your fellow amateurs for overmodulation? A few locals think that if they transmit on a wide band of frequencies that they will have a better chance in snagging a few extended ground-wave stations. They could



Operator or equipment? With this modest receiving set-up, operating skill, and patience, Peter W. Drew of 84 Adelma Road, Nedlands, Western Australia is hearing many Novices from the states. Peter is 17 years old hopes to have a license to operate soon. He would make an interesting pen-pal.

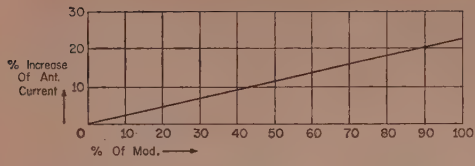


Fig. 1—Graph showing modulation percentage as related to antenna current.

do much better if they put all of that sideband power in a narrow bandwidth and at the same time not incite the wrath of fellow amateurs. Let's clean up those signals. Don't just operate, co-operate.

Two methods are commonly used to measure the modulation percentage of an a.m. signal. The first method, which is based on the fact that the antenna current increases with the degree of modulation, is a fast means of determining the modulation percentage, this method is accurate enough for the amateur. The second method, which uses an oscilloscope is more accurate and is in common use today. A resume of both methods will be given here.

When a transmitter is 100 percent modulated by a sine wave, it's input power and hence it's output power will rise by 50 percent. That is, a transmitter with 100 watts output will put out 150 watts when 100 percent modulated. The current in the feedline will rise in the ratio of the square root of this 50 percent increase which means that the antenna current will rise by 22.5 percent under 100 percent modulation. A modulation percentage of less than 100 percent will increase the antenna current proportionately. Knowing this, we can measure modulation percentage by measuring antenna current. The graph in fig. 1 shows the relationship.

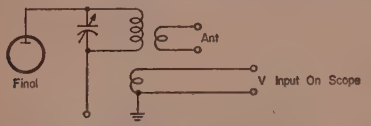


Fig. 2—Circuit for obtaining envelope type patterns on a scope for modulation monitoring.

Oscilloscope Method

The cathode-ray oscilloscope is widely used as an amplitude-modulation monitor and measuring instrument. The oscilloscope presents a fairly reliable visual presentation of modulation percentage if adjusted correctly. Two types of patterns are shown by the oscilloscope display depending upon the way the scope is hooked to the transmitter. Fig. 2 connection displays the actual shape of the modulation envelope because the oscilloscope linear time base, a sawtooth wave, is used to sweep the horizontal axis. The pattern varies continuously with modulation making it difficult to accurately measure modulation percentage but the trained operator can tell at a glance the approximate modulation percentage. While modulation percentage is difficult to measure overmodulation can readily be seen. Any book on the oscilloscope will show how to interpret the patterns as shown on the screen.

When the oscilloscope is connected to the transmitter as shown in fig. 3, the pattern resulting from the use of the modulator voltage as a sweep is known as a trapezoidal pattern. The experienced operator can detect many operating deficiencies in the transmitter by correctly reading the patterns shown on the screen of the oscilloscope.

With the oscilloscope connected as shown and with the modulator not working, the r.f. carrier appears as a vertical trace on the screen, its height is adjusted by the vertical gain control on the oscilloscope and centered horizontally. When the modulator is operating, the pattern assumes the familiar trapezoidal shape as shown in the illustrations. The longer side of the trapezoidal pattern represents modulation peaks; the shorter side indicates modulation troughs. At 100 percent modulation, the wedge shaped pattern assumes a point on the shorter side making a triangle. Overmodulation (beyond 100 percent) causes this point to form a line from this point. The trapezoidal pattern presents a more easily read pattern to show modulation percentage. Be sure to shield against stray pick-up of r.f. energy as this will distort the pattern and make it difficult to read.

Many amateurs have scopes in the shack but I have yet to see one hooked up and in use at any station visited. Failure to check modulation percentages and operating parameters of our station is one of the reasons that so many hams think they need high power to get out of the backyard. No one wants to listen to a rotten signal on the air when there are good ones much easier to copy just waiting for a call.

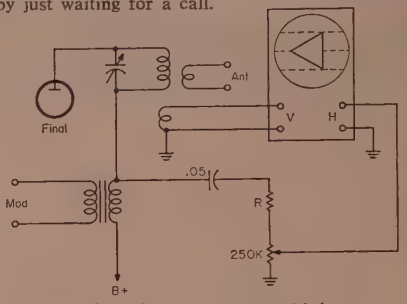


Fig. 3—Circuit for obtaining trapazoidal pattern to indicate modulation percentage on a scope. Coax should be used to connect the transmitter to the scope to prevent stray r.f. pickup. Resistor R should be 250 K ohms for each 100v. of plate voltage on the final.

Letters

I hate to be the cause in any small way for a man breaking his New Year's resolutions but in this case my sadness will move over for pride when it is a well-known fact that the backslider gained more than he lost. I might say that I have often had the same idea in mind but knew that I was too weak willed to carry it through. At least WV6YAL is not ashamed or disappointed of the facts. Read on, friend. . . .

"Dear Walt, I am sending you a picture of my Novice station which you may publish if you desire.

"I have a National 190 which I used for s.w.l.ing and then the bug bit me and now I have a used Collins 75S-1 and a Globe Scout running into a vertical antenna. I have 27 states confirmed. I went on the air in March of this year. I have just received my Technician call but will keep on trying for the General, my code speed is almost up to the right speed. After I get my General I will be happy to help any Novice or any one wanting to become a ham. I will lend my code records and books to anyone needing them and help as much as I am capable.

"Walt, I resolved last January not to subscribe to any more publications, but your column and *CQ* in general was *too good* to take a chance on missing a copy. So I broke my resolution and subscribed to-day. I know its

[*continued on page 100*]

K4VIC at the key of station WN4HRG in Rogersville, Tennessee. R. L. Turner, WN4HRG is doing a bang-up job from this setup in garnering those states for WAS. Read his letter in the column.

RTTY

BYRON H. KRETZMAN*, W2JTP

RTTY Operating Frequencies

Nets centered on frequencies given; operation usually ± 10 kc.

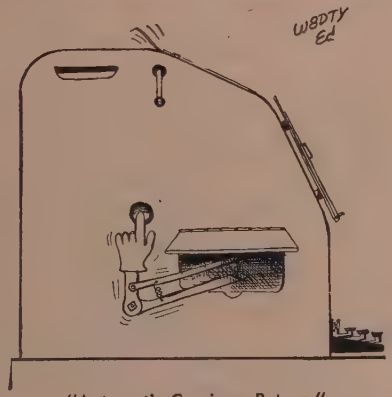
80 meters	3620 kc
40 meters	7040 kc
20 meters	14,090 kc
15 meters	21,090 kc
6 meters	52.6 mc

BACK in the June and September (1962) issues, in this RTTY COLUMN, we described the surplus radioteletype receiving converters of the AN/URA series, namely the CV-57, CV-71, and the CV-89. As we said, these converters and their associated combiner units each have a built-in tone oscillator whose purpose was to re-transmit the received f.s.k. signal as a make-and-break audio tone over wire lines or a v.h.f. link to a distant Teletype signal center. Incidentally, there are other more ancient surplus converters that have similar tone oscillators.

Naturally, few RTTY amateurs have any use for these tone oscillators in their original application, but now W3IJF has found a very good use for these oscillators in any RTTY ham shack operating the h.f. bands. Milford C. Gossard, W3IJF, uses his to set his frequency shift, a very noble application, judging from the different values of shift observed on the air by this operator.

*431 Woodbury Road, Huntington, New York.

RTTY The Hard Way...No. 15



"Automatic Carriage Return."

The Tone Oscillator

Let us briefly review these tone oscillators. A look at the audio frequencies involved will disclose a 170 cycle spacing between the seven different tones available by means of a panel selector switch. The frequencies available are: 595, 765, 1105, 1275, 1445, 1615, and 1785 cycles. A little arithmetic tells us that 170 divided into 850 is 5 times. So, between the 1st tone (595) and the 5th tone (1445) there is 850 cycles, exactly the standard amount of shift most RTTYers use. MARS stations also use 850 cycles, it should be noted.

Using the Tones

Now, let us describe the methods developed by W3IJF of using these tones to set out shift. Let's use the 595 and 1445 cycle pair. If you have a 'scope you can see what you are doing; if not, you will have to use your ear. Figure 1 shows the 'scope method while fig. 2 shows the aural method.

With the 'scope method, the audio output from the tone oscillator is fed to the vertical input of the 'scope and the output from the station receiver is connected to the horizontal input of

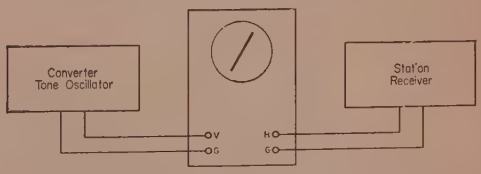


Fig. 1—'Scope method of frequency shift calibration.

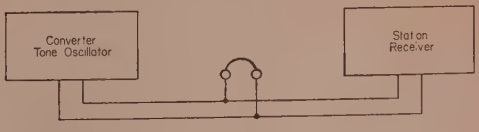


Fig. 2—Aural method of frequency shift calibration.

K9ZQT, Rantoul, Illinois.

the 'scope. What we are looking for here is the Lissajous figure for a 1-to-1 ratio: a straight line or a circle, when the pattern stands still. The b.f.o. of the receiver is on, the f.s.k. v.f.o. is on *mark* high and is turned on for spotting. *(Leave the transmitter off!)* The tone oscillator should be switched to 1445 and the receiver is tuned on the low side of the f.s.k. signal until a 1445 cycle signal is heard. By watching the 'scope, zero beat between the tone oscillator and the tone coming out of the receiver is easily found. Now switch the tone oscillator to 595 and put the v.f.o. on *space*. Leave the receiver dial and the v.f.o. dial right where it was. Use your shift-adjust control now to set the tone coming out of the receiver to exactly 595 cycles as indicated by zero beat on the 'scope.

The aural method is very similar in procedure to that used with the 'scope method. The only difference is that you must *listen* for zero beat between the tone oscillator and the tone coming out of the receiver. Audio gain controls should be adjusted so that approximately the same level is obtained from the tone oscillator and from the receiver. Turn the shift-adjust control slowly. A fast flutter will be heard which will slowly decrease in frequency until it disappears. This is zero beat.

How do you know that the audio frequencies coming out of the tone oscillator are correct? Chances are very good that they are. Frequency-determining components in these oscillators are usually fixed at the time of manufacture. You can check this easily by using two additional pairs, 765-1615, and 935-1785 cycles. Results should be within a few cycles.

Project DESPAIR

In the February and March (1962) RTTY Columns we described W2JAV's transistorized RTTY converter and his accompanying a.f.s.k. oscillator. We told then of the difficulties Phil had in attempting to get the printed circuit boards made by someone at a reasonable price, reasonable to the raido amateur, that is. We thought *we* could help. In subsequent issues we told you that we found out just how this project got its name. Oh sure, we received lots of offers to help. If we provided the art work (the masters) the boards could be supplied for $1.75 to $5.00 each, *if* we ordered several hundred of each, at once. We tried a couple of the lower priced offers and found the suppliers unreliable. (Promises, not boards were supplied.)

Now, at long last, we *have* been able to get a supply of these boards at a reasonable price. This has been made possible through the help of Steve Lipsky, W2VVN, who serves on the Editorial Board of *Semiconductor Products* Magazine (a Cowan publication) and through the cooperation of Loral Electronics Corporation of New York whose management believes in the encouragement of radio amateurs. These boards now can be supplied by us at cost plus a small charge for postage, packing, and for the technical data sheets enclosed. This comes to $1.50 per board. These are glass-base boards, and are undrilled. Can you beat *that?*

At this point we should review the information as published. Starting with the W2JAV Transistorized TU in the February 1962 RTTY COLUMN, it should be noted that there is an error in Fig. 2 which shows the parts placement. The resistor in the emitter circuit of Q_2 should be 8.2K ohms instead of the 2.2K shown. In the description of the W2JAV Transistorized A.F.S.K. Oscillator in the March 1962 RTTY COLUMN it should be noted that there are a few errors in fig. 1, the schematic diagram. The capacitator between the base and collector of Q_1 should be 0.01 mf instead of the 0.1 shown. The capacitor between the emitter of Q_1 and CR_1 is 0.1 mf. (This didn't print too clearly.) Also, we have been chided on the selection of the Zener diode CR_2. (That's what was in Phil's junk box.) Our own a.f.s.k. oscillator uses a Hoffman 1N466, which is quite satisfactory and much less expensive.

The photos of the boards show them notched at the connector end to fit the particular connectors Phil had. The boards we supply will not be notched so you can fit them to the connectors *you* have, or can scrounge. Recommended are the Continental (Dejur-Amsco) PCS22 for the TU and the PCSC10 for the a.f.s.k. oscillator. The Amphenol 143 series of printed circuit board connectors can also be used if the boards are carefully notched.

Now, to get your boards, send $1.50 for each board you want. Tell me how many of each type; the converter board or the a.f.s.k. oscillator board. Send your money to me at 431 Woodbury Road, Huntington, New York. Make out a check or money order payable to Byron H. Kretzman. Your boards will then be sent by return mail.

On the Bauds

W1LWV of Millinocket, Maine, now has a KWS-1, an R-390A receiver, and an AN/URA-8A converter. Nick has a couple of Northern Radio Type 152 narrow-shift audio TU's for trade. Nick also reports that K1ALZ is on with a Model 26, and FRA converter, and an SP-600JX receiver. W2OQL of Cherry Hill, N. J., has built the W2JAV transistorized TU to go with his Model 15. Frank is looking for paper for his machine. WA2HWJ of Huntington Station, N. Y., now has a model 26 for 2, 40, and 80. K2RTQ of Kenmore, N. Y., is building a polar relay test set (page 70, the *New RTTY Handbook*). W3WGC of Brackney, Pa., is on 80.

W6VQB/4, ex-CE3AGI and CE3WZ (*Remember his RTTY from Chile?*), is now with Bendix in Marietta, Georgia. W5FHW of Fort Worth, Texas, is on 80, 40, and 20 with his Model 19 and a home-brew transmitter. K7LRK/5 at Blytheville Air Base, Arkansas hasn't been able to get a machine from Air Force MARS. (!) K5OXZ of Pine Bluff, Arkansas, has a CV-57 converter for sale. WA6TBC of

[*Continued on page 125*]

YL

LOUISA B. SANDO*, W5RZJ

THIS last summer K6ZKH, Marge Carter, and OM Dick, K6ZNQ, enjoyed a trip most of just dream about. Arriving in Ireland via the S.S. *America*, they traveled through England, Scotland, the Scandanavian and Low Countries, Germany, Switzerland and France. In Scotland they met GM3NYG, Joan Fish. Joan joined RSGB in '52 as an s.w.l., never thinking of becoming a ham. With encouragement from other members, night classes in theory and code practice given by a ham fellow worker during lunch hours, Joan got her license nearly 3 years ago. Although she runs low power (40 w. phone, 60 c.w.), look for her on 20 and 15 weekends until 1500 (local); she works 80 weekday evenings.

In Stockholm they had dinner with Anne Marie Olsson, SM5BLX. Anne is a research librarian for an electronics firm. She operates all bands phone.

In Copenhagen Margaret Rasmussen, OZ1MR, and OM OZ1PR entertained the Carters. Margaret is a native of England and met Paul when he was on vacation. When Paul got on 20 phone Margaret assisted with QSLs, *etc.* But when he went on c.w. she decided she'd have to get her own ticket. She spent 6 months studying theory in English, 6 months in the Danish language, then took the *oral* technical exam (and *we* think it's tough!). With a "C" license she spent a year on c.w. with 10 watts. Early in '62 she got her "B" and now works phone-c.w. with 100 watts. Margaret says the Stateside YLs get OM QRM from all Europe, but look for OZ1MR between 1100-1430 and 1600-1900 GMT Mon.-Fri.

In Amsterdam Marge and Dick spent an evening with PAØHIL, Hil Neumann-Kettner, and OM PAØNMN. Hil is on 20, 40, 80 phone-c.w. She had been assisting her OM, a dentist, in his office.

In Brussels the Carters visited ON4YL, Mony de Roeck, and OM ON4OM. Mony formerly was much sought after DX as OQ5FH. Because of the difficulties in the Belgian Congo, Mony and Bob fled their home on less than an hour's notice, losing all their gear except the receiver Mony carried under her arm. Off the air when Marge met them, they hoped to be operating soon.

On the subject of DX, we received this list from OM G3IDG, which he says is current and complete, of YLs licensed in the United Kingdom: G2YL; G3's ACC, ELK, GDI, GOX, HYL, IYL, JZP, JZY, LDK, LWY, MER, NOB, NQD, NYL, OBA, OHB, OJW, OMN, ORU, PNX, YL; G6YL; G8LY; GM2IA; GM3's IMR, NYG (see above); GW3JGU; EI6S.

PJ5CG-PJ5CH

Some calls to listen for during January—PJ5CG and PJ5CH—issued to Kirk and Ginny Bush, KØGZN-GZO. They will spend a few days on Curacao but most of their two weeks in the Caribbean will be on the island of Bonaire. They'll operate SSB only on 10-15-20, in the DX freq. and U.S. bands.

YLRL

For your operating calendar, here are the dates of YLRL's YL/OM Contest for 1963: Phone-March 2-3; CW-March 16-17. Rules in next issue.

In the September "Howdy Days" contest K1EKO, Edie, placed first with 96 points, followed by W5JCY, 84; W1ZEN, 83; K1ADY, 77; K5BNQ, 72; K8LHF, 65; W5UXW, 56; W6YZY, 53; W9AXV, 52, *etc.*

With the Clubs

Current officers of WAYLARC: Pres., K4EAM, Vi; V.P., W3RXJ, Irene; secy., W4TVT, Claire; treas., K3SQX, Sandra; Foundation reps., W3CDQ, Liz; K4BNG, Janie.

Taking office in November for the Portland Roses: Pres., W7ZMN, Phyllis; V.P.-treas., W7REU, Dorthie; secy., K7ADI, Ruth; P/C, W7NJS, Beth.

Members of HAWK celebrated the club's 5th anniversary with a party Sept. 28-30 at Plymouth, Ind.

*4417 Eleventh St., N.W., Albuquerque, N.M.

K7MRX, Fran Bailey, secretary of YLRL for 1963.

Marge Carter, K6ZKH and OM Dick, K6ZNQ had the pleasure of meeting this attractive group of YL's during a European trip last summer. Top l. to r. ON4YL, Mony de Roeck, ex-OQ5FH; SM5BLX, Anne Marie Olsson and K6ZKH; OZ1MR, Margaret Rasmussen. Bottom l. to r. K6ZKH with GM3NYG, Joan Fish; PAØHIL, Hil Newman-Kettner.

Officers elected at this time: Pres., K9SUT, Ann; V.P., K9TCM, Marge; secy, K9FZX, Annie; treas., K9UXV, Ruby.

The Colorado YLs held a business meeting during the RMD convention—and celebrated their first anniversary as a club. Newly elected officers include: Pres., WØWZN, Ann; V.P., W6AAX/Ø, Clarice; S-T, WØUTO. Allie; historian, KØBTV, Kay; P/C, KØZRI, Phyllis.

Our condolences to W9GME, Grace, founder of the Chicago YLRL, on the passing of her OM, Jim, in September.

National Convention

Highlight for the licensed YLs at the National Convention at Portland over Labor Day weekend was the YLRL dinner and forum conducted by K4LMB (ex-W7FWB), Ethel, founder of YLRL. W7GGV, Helen, 47 YLs attended, among them At this meeting the 19 aprons embroidered by various YL clubs were given away. Gift from the Portland Roses, hostesses for the YLs/XYLs attending, was a knitted afghan in autumn colors, won by W7FVF. In addition to all the Ham activities, the gals had two group breakfasts and a luncheon (with gifts for all), tours, style show, speakers, and SWOOP initiation.

At the SWOOP initiation during the National Convention at Portland the licensed YLs seem to have had as much fun as the non-Ham XYLs for whom SWOOP is put on. In front, W7HPT, Bev, and standing l. to r., Bernie Bean, Joan Bentson; K7BED, Bettie; K7BII, Mary; W7ZKY, Dee; K7ADI, Ruth.

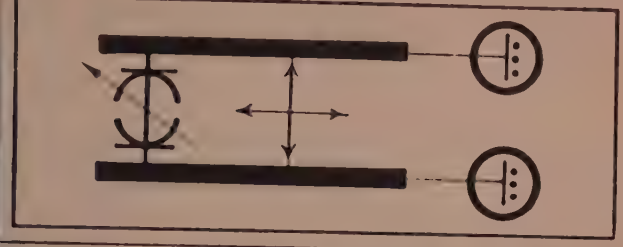
Did You Have . . .

Happy Holidays? Hope so, and that your gifts included a copy of *CQ YL*, the one and only book about women Hams. If you don't yet have your copy, order from W5RZJ (QTH at head of column). Containing 18 chapters, over 500 photographs and info on hundreds of more YLs, *CQ YL* is only $3, postpaid.

—33, W5RZJ

Vol. 5, No. 1—January 1963

VHF



AMATEUR

Editorial...

Bob Brown, K2ZSQ

In keeping with the season close at hand, and the spirit of '63, we thought we might devote some time to a progress report on *The VHF Amateur*. As you probably know, two short months ago this magazine merged with *CQ* in an effort to offer both publications the greatest VHF coverage ever. A move like this on the part of the publishers always involves a bit of editorial hesitency. The reason for this is obvious . . . we wonder what the changing readership will desire. Our first edition in November somewhat resembled *CQ* in layout, format, and general presentation. By now, however, you've probably started to notice a few changes.

Due to the time lag involved between the actual writing of an article such as this and publication, at this writing we are just beginning to get letters from you. The November and December editions were prepared more or less "in the dark" and we were groping in our own minds to come up with a suitable magazine. But thanks to your letters, we are now walking on firmer ground. Our gratitude; Keep those letters coming! We want to know what you would like to see on these pages. The only way to find out is through letters. Do your part.

WA2VLR has done it again! Yes, this is the Peninsula Amateur Radio Klub's antenna installation during the summer VHF contest. The ladder was base mounted on a Park Commission truck, then extended. We've just been informed that the group has recently acquired a Clegg Zeus to add to the merriment. Our hat's off to the boys of Bayonne, New Jersey!

The mail so far indicates a trend toward less columns and more features. One reader went so far as to say, "Let's have a book crammed full of VHF articles, preferably short and to the point." Bearing in mind these letters and suggestions, we are faced with the problem of where to put them. So starting with the February issue, the VHF SSB column will appear every two months, and Ken Phillips, K8CHE (our ANSWERMAN columnist) will contribute his writings in the form of short articles, perhaps one or two every month. With all considered, this will give us room for more articles and features. Your comments would be appreciated.

VHF Confidential

If you've ever had any aspirations to be a world-famous writer, now is your chance. In addition to most unquestionable glory, we also offer a more monetarily satisfactory item: a check. Drop me a line for our rates and preferences. Avoid the big rush—mail your masterpiece today. You might find it in print here next month. At the moment we are especially on the lookout for small VHF construction items, such as preamplifiers, two tube converters and the like. Let's see what you can come up with.

73, Bob, K2ZSQ

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A v.h.f. man's paradise—a tropical island, cool sea breezes, and two rigs. Who could ask for more? Here we see author KV4CQ at the controls.

Safari on Six

RANDOLPH C. BLODGETT, SR., WA2DEW/KV4CQ
372 Essex Avenue
Bloomfield, New Jersey

EARLY this year I went to our home in St. Thomas, Virgin Islands where the swimming is much better exercise than having to shovel snow in New Jersey. This trip differed from the others because the XYL and I went loaded with six meter gear, antenna, cable, spare parts, *etc.* We shipped two transceivers ahead by Alcoa Steamship Company along with more household items for the house.

A very good friend, George Kupp, K2DQT, furnished a six meter rig and we took a bright new Poly-Comm 62B transceiver which was acquired just two days before shipping time. Through the courtesy of Joe Lahullier, K2QLW, who is thoroughly familiar with the Poly-Comm, and who spent one evening instructing me in its operation, I became acquainted with many of its fine features.

I noted in past years a marked absence of 50 mc work in these islands; however, Puerto Rico is fast growing in the six meter populace with quite a few excellently equipped stations. Therefore in starting from scratch we not only faced a series of installation problems but also a challenge as to whether or not there would be any activity within range.

Location

Operation from the island QTH was considered to be very good from a topographical standpoint, located as we were near the top of a hill about 150 feet above sea level; the Atlantic one half mile to the north and the Caribbean one half mile to the east. This gave an unforgettable view to the horizon obstructed only by the islands. Briefly, British Tortola, St. John and St. Croix of the U.S. group are just a few miles away; to the west, Puerto Rico is also in the clear except for some low foothills which were not expected to offer the difficulty in transmission that we would have over the mountains to the northwest.

I had been advised that at this time of the year some nice band openings could occur which possibly might reach the USA, Mexico, and parts of South America. But it seems that the seasons were changing there as elsewhere in the world and neither the sporadic-E nor the transequatorial skip offered openings. I did learn, however, of two openings to the continent in which Puerto Rican stations were able to work for DX, but these were of short duration.

After getting the rigs set up, we operated on a calling schedule of 8 AM and 9 PM for three days of the week plus frequent listening-in periods during the day and late evening. (We couldn't walk by the rig without a try). This period of operation covered a period of nearly two months in the spring of this year. It was quite a schedule to observe along with other duties

involving further construction coupled with some vacation, however, having taken on the task we felt that no possible opportunity for contacts should be overlooked.

Results

I was fortunate in that William Werner, KP4DJ, ARRL Section Communications Manager in San Juan motivated several of the six meter gang there to monitor my transmissions for several weeks and we were advised that Manuel Romero, KP4AVB, of Santuce was also on the lookout for our calls. While the Puerto Rico stations were frequently heard here, it was never possible for a contact to be established from this QTH.

The second rig was used as portable and fixed station for working from different locations about the island. When located in the municipality of Charlotte Amalie, midway on the island and somewhat surrounded by mountains, rather heavy QRM was experienced much of the time.

Cecil Daniel, KV4AC, was heard in Puerto Rico on several occasions; he could also contact my base station even though the terrain was hilly between stations. Further proof that six meters will climb hills was brought out in the case of a portable location directly to the north of the QTH where difficulty would normally have been expected. Here, KV4CW, used at the residence of Carl Jensen, provided daily contacts regardless of the hour. Carl experimented with several types of antennas (including his CB equipment) and it was surprising how little difference was noted in the reception at either end. He also paralleled the transmissions with the CB rig and, while the results can not be considered conclusive, there was some indication that the six meter operation was somewhat better. There was, of course, a difference in the power employed, but on the other hand there was no interference from other stations or much noise figure to contend with at this end of the island, so perhaps the element of power may not be so significant a factor . . . The contacts from these various locations seemed to be consistent for any local ragchew mode. It was noted, however, that when the eleven meter band was open there was a good bit heard from many portions of the continent.

There was no TVI experienced although on almost every CQ or QSO the statement was made to drop a card in my mail box if the transmission was being intercepted.

Prospects for Future

In conclusion, it is felt that the experiment was an awful lot of fun, although it fell far below the expectations 6 meter-wise. Nevertheless there are some worthwhile comments offered to possible future stations contemplating this trip . . . Six meter operation is feasible for on-island and inland communications. Use the best antenna system possible. The opportunitities are unlimited for experimentation toward South America and other islands along the way. The band is far from crowded. Having the advantage of sporadic-E; and TE, DX offers its availability. These Virgin Islands and other nearby islands should form v.h.f. nets and schedule operations if at all possible. This island seems quite favorable for DX, especially if one lives near the mountain areas.

Since returning to the Continent and discussing this six meter "safari" with others also somewhat interested in the use of single side band operations it would seem that our initial attempts were in the right direction. Through experimentation with a.m., a general system of communications can be established on the islands, but there is no doubt that introducing s.s.b. on v.h.f. would provide much better results.

My thanks to WA4FOQ, LU3DCA, K2DQT, K2QLW, K2UQC, K2VUU, KP4DJ, KP4AVB, KV4AC, and KV4AA for their suggestions and aid, without which preparations for this trip would have been impossible.

The next trip to the island QTH should provide further operations on the six meter circuit as well as some activity to the USA on the lower frequencies. ■

Cover Story: W2GHR's Antenna

2 to 6 Meters — Automatically

OUR cover this month shows the repeater antenna installation high above Mt. Beacon, in upstate New York. The 220 mc corner reflectors in the right of the photograph are pointing south toward Long Island, while the omni-directional antenna (opposite the corner reflectors) are used for 440 megacycles. The two meter antenna, unfortunately, is hidden behind the tower in this shot. Those "doughnuts" at the top belong to an f.m. station (commercial) as well as other antennas shown in the photo.

W2GHR maintains an operational group of VHF repeaters, scattered throughout the northeastern area. The purpose of these units is for rebroadcasting 6 meter f.m. signals on 52.64 mc to two meters on 146.94 mc. Stations in upstate New York can also call CQ from their mobile f.m. rigs on 146.94 mc and have their signals rebroadcast through the Mt. Beacon repeater to Long Island on 52.64 mc—*automatically!*

Most hams involved in this intriguing avenue of the VHF field use inexpensive 30 to 60 watt f.m. equipment, which we understand has been available in the form of old taxi cabs radios and the like.

We hope to have in the near future the complete story on these interesting operations from Gordon, W2GHR. ■

First of a Series:

Getting Along with the Indians

DAVID L. HELLER, K3HNP
14 Darkleaf Lane
Levittown, Pennsylanvia

TVI (television interference, commonly referred to as "Tennessee Valley Indians") is certainly one of amateur radio's biggest problems. This series will provide a fairly thorough answer to the problems of operating v.h.f. stations close to ordinary TV sets. Even though most of the many published articles on TVI are accurate and apparently comprehensive, there are still many hams, especially v.h.f.'ers, who severely restrict their operating in deference to real or imagined TVI. This is all wrong. Your transmitter is either clean or not clean. If you are clean, you're licensed to operate 24 hours a day; the more you're on, the better. If you are not clean you should stay off completely. There is no in-between. The "no six meters before 11 PM" stuff is abhorrent.

For this series I've reviewed my experiences both as an active v.h.f. operator and as chairman of a TVI committee to determine what actual problems are involved in v.h.f. operations. I will try to show how to recognize these problems and how to overcome them.

No Indians?

I don't believe there exists a ham who is on the air (and has neighbors) who doesn't have even a trace of TVI. Those who take the initiative in facing the problem and curing it usually fare much better.

Bureau of Indian Affairs

Many localities have active interference committees. These organizations are primarily amateur sponsored and operated, though occasionally other groups such as servicemen, CB'ers, and power companies are represented. The usual functions of a committee include processing complaints forwarded through the FCC; complaints received directly; assisting amateurs with interference difficulties, and tracking sources of interference of all types. Each committee has its own mode of operation, and it's usually best that all amateurs follow the local committee's recommendations without exception. This practice can avoid the serious difficulties which arise whenever "indians" in different parts of town compare entirely different stories, even though both be entirely accurate . . .

My first recommendation to any v.h.f. amateur, therefore, is to get in touch with the local interference committee to learn how they operate and to receive any advance instructions. So far as my own committee is concerned, I like to hear from any new amateur *before* he goes on the air, for then even the first of the inevitable complaints can be handled most rapidly and efficiently. Additionally, the amateur can, if he desires, receive an "official" inspection right at the start, and be able to operate with the knowledge that everything is okay.

Getting Along with the Sheriff

An inspection by an interference committee is very much like a check by an FCC engineer, though perhaps the committee is a bit more exacting. The checkout starts with a look at the station license and log, to make sure both are current *and properly signed.* The transmitting equipment will be noted for reference. The inspector will then check the ham's own television set on all channels while the station is operated on *all* bands and *all* modes normally used.

Each local channel must be free of objectionable effects from the transmitter, either audio or video. Different inspectors have different requirements. Some will permit no traces of the transmitter whatever; others will not object to a very slight herringbone that could not be considered objectionable to the viewer.

More distant stations are not "protected" by FCC. The committee will inspect all channels, however, and if there is excessive interference to a distant channel which normally can be received satisfactorily they may recommend improvement.

There are several things that do not interest the interference inspector, whether FCC or committee (these are mentioned only because they're generally repeated continuously by operators checked by my own committee). The fact that a rig is all "commercial" has no bearing on TVI. A homebrew transmitter can be completely clean while some commercial rigs are not. A low s.w.r. does not interest the inspector. The presence of shielding or a low-pass filter on the rig is not important if the end result is not improved. *All that interests the inspector is whether or not your own TV is clean.*

Other Tribes

Amateurs get into many things beside TV sets. Telephones, public address systems, hi-fi's and phonographs are frequent sources of complaints. These cannot possibly reflect on the amateurs regardless how he operates his rig. Neither telephones nor audio amplifiers are supposed to detect r.f. If they do, it's not the amateur's problem.

F.m. and broadcast radios also are frequently affected by v.h.f. transmitters. The broadcast band (.5 to 1.5 mc) is so far below the higher amateur bands that the problem must be in the broadcast receiver itself. The f.m. band (88 to 108 mc) includes the second harmonic of six meters so it's quite feasible to be able to tune nearby six meter stations on this harmonic in the vicinity of 101 mc. If there is no *local* station on this frequency or thereabouts there is no problem. Some f.m. tuners are practically blocked over their entire range by a strong six meter station. This may or may not be entirely the fault of the tuner. These situations will be covered in detail later.

How to Avoid War

So far we haven't been much help in actually clearing TVI. This was deliberate. First one must learn to recognize when real TVI actually exists. Also there are some things that every amateur, especially the v.h.f.'er, must recognize before he dares talk to an "indian" or go near a TV set. These suggestions are not hypothetical. They're based on my experiences both as a v.h.f. operator and as a committee chairman. The technical problems of t.v.i. are minor. The problem of explaining t.v.i. and filters to some neighbors is major. Handled properly, however, these problems rapidly fade.

Complainers are usually divided into separate categories. Each must be handled differently. First and most obnoxious is the *anonymous caller*. He'll ring your phone, and if he says anything it will be obscene and demanding. He is acting outside the law in many states and the telephone company Special Investigator's office or the police might help if he gets out of hand. All he wants is for you to get off the air while he is watching TV. Perhaps your best action here is to operate as much as possible while you think he's being bothered. He deserves little consideration in view of his actions. Use discretion according to your individual neighborhood and insurance coverage.

Second is the caller who identifies himself but quite emphatically lets you know he isn't going to do anything at his end. The intercepted amateur will generally be unable to pacify this type. He's obnoxious, but only because of ignorance. Refer the case to the local committee immediately. Everything you tell this complainer, no matter how accurate you are, will just complicate the case. His mind is made up.

The average "indian" wants to do whatever is necessary to be rid of your signal. He won't mind getting a filter when he learns it's free. A cautious explanation usually suffices. Avoid too much explaining. He's easy to control in his present state, but could convert into one of the above characters.

A surprising number of "indians" know the TVI is their own problem and call only for assistance. Give them help promptly. Don't hesitate to make antenna adjustments or even a demonstration showing them how to install a filter. But be very cautious about installing the filter yourself. Learn your committee's policy for they may forbid your touching an "indian's" set. Give this group excellent and prompt service. The word will spread. General policy: don't touch his TV set, but offer advice.

There are many "indians" who do nothing about it. Some don't care; others don't want to bother you, or are afraid to call, and a few don't want to hurt your feelings! Often your friendly immediate neighbors will absorb a lot of TVI and say nothing. Try to convince them that they must let you know immediately of any interference. Get them cleaned up perfectly even if you have to install a new antenna, filter, or anything else. They are your best publicity for TVI-free operation, and, in case of real transmitter trouble, they're a good advance warning system.

Signing Treaties by Proxy

The interference committee representative finds talking with complainers far easier than the interfering amateur would in most cases. He is the third party, and is in a position to refuse any backtalk from either the "indian" or the amateur. His opening statement is that he has inspected the amateur's station and found it in good order, and thus the trouble is definitely in the receiver. This is sufficient to establish his authority. This particular gambit of course gives the individual amateur much trouble. The committee man observes the affected TV set while the amateur is transmitting to determine what type of trouble is experienced and immediately recommends the initial (and, likely, the final) corrective steps. He will usually complete a report form, and leave a completed filter request form for the indian to mail if he feels a filter is needed.

Alone in the Valley

Up to now we haven't even touched the technical considerations of TVI. We have discussed the more important phase of the problem, how to handle the complaining "indian," and we've shown that whenever problems arise an active interference committee's help is the best way to keep out of trouble. But what if there's no local committee?

Every community of active amateurs should contain some sort of interference committee. A large metropolitan area might have an organized force representing numerous clubs, such as the Washington TVI Committee; smaller communities might designate one man to cover complaints. The ARRL can provide an informative portfolio on committee operation. The FCC field office should be kept informed of any organized committee operations. This magazine is also prepared to advise on committee operations.

Deputy Marshal

But let us assume you have troubles, and there is no local committee to assist you. See

if you can get another neighborhood amateur to help you handle your difficult complaints. The "indians" won't know the difference, and you'll have the real advantages of a third party doing the dirty work. The man helping you should have a working knowledge of TVI problems so that he can provide correct answers, but even if he knows nothing more than that the set needs a filter he'll get by almost all the time.

Just Who Broke the Treaty?

Let us suppose that you're on the air for the first time with a new rig. Your neighbors are complaining. Your own TV set is being bothered considerably. This might very well be a typical situation for the beginner on v.h.f. and is where the most errors are made. The usual procedure is to tear into the rig, hang filters on it, operate only in odd hours. *This is all wrong.* Remember the TVI axiom: *If you're clean on your own set, operate when you please.* Conversely, if your own TV isn't clean, stay off except for brief tests . . . completely.

The first task is to determine whether the trouble is in the TV set or the rig—or both. *It is absolutely impossible to affect TVI caused by defective receivers by working on the rig; similarly a transmitter defect cannot possibly be overcome at the receiver.* This statement is basic and has no exception, yet it seems very few hams will accept it. Read it again and again until you've learned it. Otherwise you'll never manage to clear up your TVI.

The initial cleanup at home will likely involve both the rig and your TV receiver. It's the most difficult TVI job you'll have; unfortunately it has to be the first. If experienced help can be had, take advantage of it. An experienced interference man can probably solve your problem in seconds, possibly even on the telephone. No written article can substitute for an interference committee's experience; I'll try, though, since I know some beginners will not have experienced help available and will have to rely on this and other publications.

Next month: Cleaning Up ■

A portable 50 mc beam antenna

The "Quickie-6"

DONN BAKER, WA2VOI
149 South Main Street
Salamanca, New York

HAVE you ever had the frustrating experience of being right in the middle of a good Sporadic-E session when the XYL decides she wants you to drive her downtown? Skip stations are S9 and long-awaited South Dakota breaks through . . . suddenly you surprise your spouse by making a mad dash for the family car . . . but the WØ is gone forever, lost amid the local QRM on your 54" whip. The small two element beam described here will help you retain both your sanity and your marriage when future situations arise. All you need do is to pull off the road and drive a piece of pipe in the ground. Eureka! You're in business.

Construction

This antenna is made of odds and ends that you might have lying around. Nothing is really critical except the element spacings and dimensions, so you may feel free to substitute. Total cost should be only your time; about 45 minutes of it.

The boom is a scrap piece of 1½ × ¾" outdoor plywood 60" long. (Mine was cut down to 58" to fit better in the trunk of the car.) The elements are spaced one quarter wavelength apart and consist of a half wave dipole for a driven element, and a 113¼" reflector. These were made from the elements of a well used TV antenna with loop extensions made of 8 ga. aluminum groundwire (in the form of a rug beater).

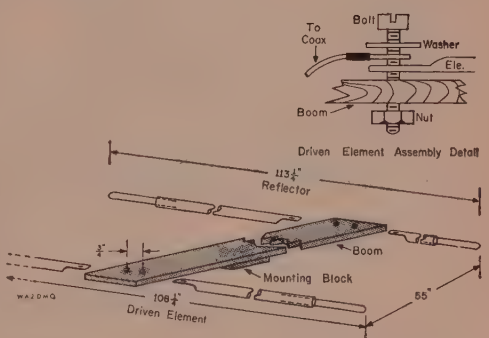


Figure 1—Assembly of the Quickie-6 antenna. Elements are TV type aluminum with 8 ga. aluminum around wire "rug beater" loops at their tips to get the required length. Mounting block shown is located at the boom's center of gravity. Antenna has a forward gain of about 4 db over a dipole.

First, find the center of gravity of the boom. Mark this for future reference. Going to the ends, leave an inch or so from the very ends and then drill two ⅛" holes ¾" apart. Bolts at least 1½" long will be forced into these holes to hold the element halves in place. By tapping the TV tubing lightly with a hammer, flatten the ends about ¾" back and drill to permit bolting to the boom. Bear in mind at this point that the four separate elements should be able to swivel back and fold next to the

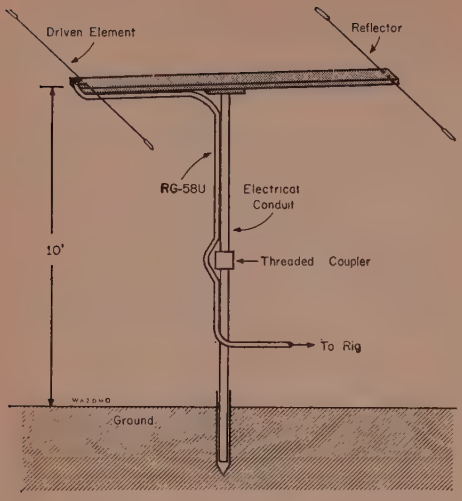


Figure 2—Final installation of WA2VOI's portable two element beam showing the pipe wedge at the base holding the conduit masting sections. No baluns or matching devices are necessary here. Antenna feeds directly with RG-58/U coaxial cable.

boom for ease of transportation. Be sure that the distance between the bolt holes on the boom is not in excess or less than 55".

Follow figure 1 for assembly details. The coaxial cable feeding the driven elements should be separated about 1 foot down from the end, so that the grounded shield and inner conductor are two separate wires. Attach a large "amp-eye" or round spade lug to each. It makes no difference which driven element gets the inner conductor and which gets the shield. Just make sure you have a good solid connection.

Now let's go back to the center point of gravity that you marked on the boom. We now need a 3 × 3 × 2" wood block drilled to accept the pipe masting. This we'll fasten on the bottom of the boom. Standard wood screws will be quite sufficient.

Bill of Materials

1—1½ × ¾" outdoor plywood, 60" long.
2—54⅛" driven elements. These can be made from television antenna elements with ground wire loop extensions at the tips to get the required length. One end of the element is flattened to permit fastening to the boom as per figure 1.
2—56½" reflector elements constructed same as the driven elements.
1—Wood block 3 × 3 × 2" with 1½" deep 1 5/16" dia. hole centered in base. Hole must fit masting.
2—5' sections of 1¼" dia. electrical conduit with ends threaded to accept coupler.
1—Threaded 1¼" coupler designed to accept the two masting sections described above.
1—Section of 1½" pipe. This serves as the ground mount and should be about 3' long with one end flattened so that it can be hammered into the earth. See figure 2.
1—25' length of RG-58/U coaxial cable with connector.
4—1¼" long threaded bolts (any type).
4—Hex nuts for above bolts (any type).
4—Washers for the bolt nut assembly. See figure 1.

Final Assembly

By taping the coaxial cable to the boom just in front of the mounting block you can provide a smooth drop and also keep the cable from flapping in the wind. For a ground mount try to get a 3' length of 1½" dia. pipe, flattened at one end to form a wedge. This can be driven into even the hardest ground with a hammer or hatchet. Hook up your two sections of electrical conduit by connecting to the coupler, and *presto*—a mast!

There you have it. What could be simpler and more compact? ■

Commentary: Cowardice

ROGER CRAWFORD, WA6PU

THE usage of c.w. on the v.h.f. bands is far lower than it should be. Agreed that many rigs including the most popular transceivers won't accept c.w. or submit directly to a key, but any rig can be adapted with minimal effort. Any modern communication receiver has a b.f.o. Excuses? There are none.

The worth of continuous wave transmission (A1) is unquestioned. On poor evenings when stations 80 miles away are heard on phone and that seems to be about the limit, 300 milers are in there with the smoke signals. Then, of course, there's aurora, frustrating on phone but fascinating and pleasurable on c.w., scatter and other propagations which are virtually "c.w. only."

The usual comment seems to be, "I just don't like it." This might be valid coming from a CB'er, but when heard from licensed amateurs it's downright disgusting. Why not fire up on c.w. when you hear some activity? Don't worry about your speed; the other station will be glad to follow your pace. Give c.w. an *honest* try. It is true that at 5 or 10 words per minute nothing gets done very fast, but you'd be surprised how your speed will increase with use.

What have you got to lose? You might actually like it and virtually give up your microphone. Or you may detest it . . . if so, forget c.w. *At least then you'll know.* ■

Six 'n Stones

TOM KNEITEL, WB2AAI, EX-W5KDR
c/o The VHF Amateur
300 West 43rd Street
New York 36, New York

Six meter hams find themselves in rather a unique situation; they inhabit a 4 mc band containing 6 mc worth of stations crowded into less than 1 mc. The reasoning behind this operation is a topic for several long articles, with those for it forming a line to the left and those agin' it on the right. So we won't go into that aspect of 6 meters for the time being.

What *does* need immediate mentioning is the fact that we, for some reason, have chosen the "togetherness" route on 6 meters and have all but abandoned the common coutersies which make amateur radio (on most other bands) a hobby rather than what might be called an *on-the-air Grand Prix.*

Here's an example: You hear a little skip coming through; you call the station. The ionospheric gods are in a good mood and the skip station comes back to you. You give the guy your handle and do a little bragging about the new rig, the antenna, *etc.* and flip it over to the DX station. His reply? He says that there is another station on your frequency who has been calling him throughout the entire transmission. Obviously the eager-beaver DX hound who has been jamming you hasn't even heard the DX station; he has (through intense concentration), however, been able to discern that perhaps if he operates on your frequency at least the other station *might* hear him instead of you . . . and it is a simple matter to then look for the DX station when he comes back to the station heard best. It is a fact that a number of stations operating in "rare" counties and areas maintain a "black list" of stations who operate in this matter and will never come back to them if eventually there is the possibility of a legit contact.

Another common lid-ism on 6: Everyone in town agrees that one frequency is going to be used for calling, or perhaps there are a lot of people in town using the more inexpensive 6 meter rigs which come equipped with a common operating frequency. In every area there is always one guy running no less than 500 watts who has a crystal for only this one frequency and who doesn't believe in monitoring before transmitting: The direct result? The tieing up of a calling frequency, or perhaps the trampling of some fellow who is earnestly trying to operate with his first ham rig. The indirect result? A mobile station who couldn't get through, or perhaps a beginner who will become discouraged, placing him one inch nearer the always increasing fraternity of inactive amateurs.

So what's the point? Is it so hard to be considerate of the other guy? Is that one single skip contact worth having everyone out there in radioland think you're a meathead Is it worth getting a beginner flustered and frustrated?

I don't know . . . I just haven't been able to decide whether these operators do it on purpose (so that *The VHF Amateur* will write them up), whether they just don't care, or whether they just don't know any better.

Whatever the reason, these fellows are detracting from the fun and usefulness of ham radio. Perhaps a few minutes of thought before pushing the TR switch might be in order, or as it is so aptly put on one of those little 5¢ joke postcards, "We'd be better off sometimes if we spent more time receiving and less time broadcasting . . ." ■

The MINI-MONITOR

TOM KNEITEL, WB2AAI

There isn't too much that has to be said about this cheap and easy c.w. monitor except that it can be whipped up in a matter of minutes.

A 2N188A transistor is used here in a modified Colpitts-type oscillator. The tuned circuit consists merely of C_1 and C_2 together with the headset determining the audible frequency of operation. This entire gadget can be jammed into a small plastic box with neither layout nor the lead lengths being critical. The pickup coil (L_1) extends from the box about three inches, held out by twisted leads stiffened with electrical tape.

Battery drain is extremely low and, if you so desire, you can even leave S_1 out of the circuit entirely without much noticeable voltage drop. Part of the energy to operate the "mini-monitor" is r.f. emissions picked up by the loop and rectified through our diode, and filtered by C_3. In actual operation, the unit's loop is simply placed near the tank coil of the transmitter, the proximity determined by your own taste. ■

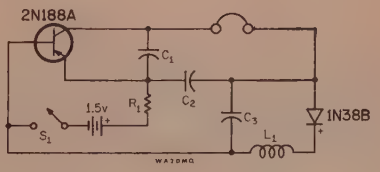


Fig. 1—Schematic diagram of a simple c.w. monitor connector to the transmitter only through the 6 turn loop (L_1). Any 1½ volt battery will do the trick, with the circuit drawing extremely low current. Suggested earphone: 5K dynamic headset.

C_1—.01 mf ceramic capacitor.
C_2—.022 mf ceramic capacitor.
C_3—.055 mf ceramic capacitor.
L_1—6 t. hookup wire, 2" dia.
R_1—25K resistor.

Variable Heat Soldering Iron

IRWIN MATH, WA2NDM
126B TAYLOR AVENUE
EAST BRUNSWICK, NEW JERSEY

THE v.h.f. experimenter who works with semiconductors and printed circuits is often in need of a low wattage soldering iron for delicate jobs as well as a medium wattage tool for larger work. The iron described here is variable between 0 and 25 watts and should fit the bill perfectly.

The iron is built in a 9 × 6 × 5" aluminum utility box as shown in the photos. The schematic diagram is in fig. 1. When soldering the variable transformer into the circuit, be sure to connect to the proper terminals or the unit simply will not work. Also be sure a 3 ampere fuse is in the holder. The pilot light, P_1, consists of a neon tube and a built-in resistor. If desired, you can use an NE-2 and a 100k ½ watt resistor instead. The iron itself is a miniature commercial type made by Oryx and operates at only 12 volts. Thus leakage into any transistor circuit is limited to this value. C_1 is used to balance the 12 volt winding and reduce any hum transmission. If it is not used, do not connect the center tap to the chassis, but rather cut it flush with the transformer case.

When construction is complete you can turn on the unit and check its operation. with the variable transformer set to maximum, the iron should reach full heat in about 1½ to 2 minutes. Reducing the transformer output will vary the heat and the iron can be used in the customary way.

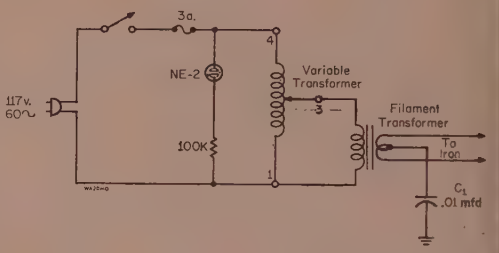
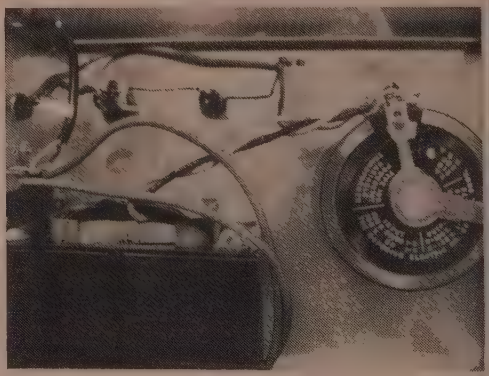


Figure 1—Schematic diagram of a variable wattage soldering iron for v.h.f. construction enthusiasts. Variable transformer shown above is actually a powerstat controlling the voltage to the iron.

Bill of Materials

1 Oryx Model 25 miniature industrial soldering iron.
1 12 volt filament transformer center tapped. (3 amperes).
1 Superior Electric Company type 10 powerstat.
1 NE-2 neon light assembly (Drake type 105).
1 SPST toggle switch.
1 3 ampere Little Fuse with panel holder.
1 Utility cabinet 9 × 6 × 5 (Bud CU-1099).
1 .01 mfd disk ceramic capacitor. ■

General view of the completed variable wattage soldering iron assembly. Unit is constructed in a 9 × 6 × 5" box.



Interior view of WA2NDM's variable heat soldering iron control box.

VHF SSB

ROBERT HEIL*, K9EID

SEEMS like only yesterday we were making our New Year's resolutions, but here is 1963 right at the door. Time sure flies. I only hope that sideband activity will continue on the very high frequencies at the rate they have in the last year.

After numerous letters and phone calls to Editor Bob, K2ZSQ, we have decided to run VHF SSB as a bi-monthly feature, rather than every month. (See this month's EDITORIAL.) The reason for this is two-fold; first, there's the ever-present problem of digging up enough news to fill the space, and secondly, this will offer me a chance to do one or two short sideband articles (construction) in the 'feature' section of *The VHF Amateur*. I'll still be here, never fear. Just don't forget those letters!

FLASH

A new FCC ruling now provides operation in the 420 to 450 mc band using maximum amateur power levels. Exceptions are certain areas of California, Nevada, New Mexico, Texas, and all of Florida and Arizona. See CQ*'s* ANNOUNCEMENTS *column for details. More next month.*

News and Activities

. . . *W9BLZ*—of Granite City, Illinois, has one of the new SB-62 mixer units described in the Nov. *VHF Amateur* driving his 829B final and is having a ball now that his 10B is going with a new v.f.o. Now he's working on a two meter system . . . *K9SGD*—of Sparta, Illinois is on two meter s.s.b. Been working Whitey, W9KQX, in Springfield, Illinois, around 2200 CST with great success. They both operate around 144.35 mc on upper sideband. Joe has his new 64 element "J" beam and a new tower on the way up (probably in the snow!) . . . *WØYMG*—is another new 2 meter sidebander. Be sure to listen for him . . . *KØGZD*—Grand Island, Nebraska, is back on 2 meters with *one kw*, all sideband. What a signal . . . *WØONL*—in Topeka is looking for sideband skeds. Anyone? . . . *KØLAD/KØREE*—Dennis and Irene, respectively, are from Topeka, running their "lil imp" exciter driving an ARC-1 mixer and the push-pull 4CX250b's to a 10 over 10 up 75 feet. Dennis is probably thinking of how he can get that antenna down and add a comparable array on 6 meters. (He estimates 10 vertical and 10 horizontal elements on the same boom, 47 feet long)

. . . *W9HGE*—Beloit, Wisconsin, has a very interesting home-brew rig on 50 mc. It is fully capable of the legal limit, using a 3-400Z in the final. This plus a crystal filter, 42 mc v.f.o. all feeds into his 7 element 24 foot 6 meter yagi, up 50 feet . . .

Columnist Bob Heil, K9EID, at the keyboard where he entertains at the Holiday Inn, St. Louis. Drop in sometime for an eyeball QSO!

Two Meter SSB Frequency

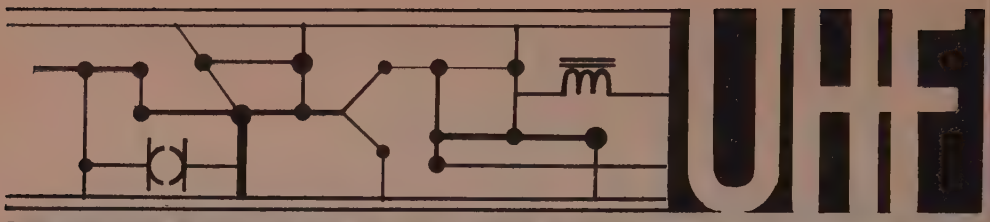
Come on fellows! Let's get together on a common meeting ground. Most of the sideband gang here in the Midwest hang out around 145.05 mc upper sideband. Gradually more and more are joining the ranks. What are your ideas on the subject? Let us hear from you.

73, Bob, K9EID

SSB SPECIAL!

Next month VHF SSB columnist Bob Heil, K9EID, and ardent sidebander, Bill Hamilton, K9SFX, have a special feature for all sidebanders, old timers as well as prospects: "Complete 50 Mc SSB Transmitter," is just that, from power supply up. Don't miss it!

*402 Border St., Marissa, Ill.



ALLEN KATZ*, K2UYH

STARTING that new construction project can be a problem, especially for the newcomer to the u.h.f. spectrum. The bottleneck appears to be that of obtaining proper parts. A radio parts store can be very helpful if you wish to buy a capacitor for a six meter rig, but if you want a piece of copper for the cavity in a 1296 mc transmitter, this radio parts store can prove a disappointment. The best place to start hunting for parts to be used in a 432 or 1296 mc rig is the corner hardware store. Most of these outfits carry copper tubing in sizes up to one inch in diameter. For larger sizes, you'd better try a plumbing supply establishment. Sheet copper can also be purchased at hardware stores in the form of copper "flashing"—a material used in roofing. Very thin walled copper can usually be obtained at art material outlets. Other places to look might include automotive and refrigeration dealers.

CW on UHF?

Ask the average amateur which is stronger, c.w. or phone. He'll probably answer, "c.w." Then ask: If a station transmitting on phone switches to c.w., will the c.w. signal be stronger than the phone (with the same output power)? Answer? No! True, the c.w. will be more copyable due to a factor we'll call "threshold of hearing," which simply means that you cannot copy a signal whose strength is equal to the noise. You need a little something extra . . . which comes much easier through c.w.

But this is not the real advantage of this mode. Noise is everywhere, while most amateur signals only occupy a small space. It's only common sense, then, to make your receiver sharp enough to receive just the signal without a lot of excess noise. C.w. has a more narrow bandwidth than phone and therefore when received properly it has less noise along with it. If you don't think this makes a difference, check again, for about 15 db. A broad receiver (not even too good on a.m.) will, when tuned for c.w., not be taking full advantage of the mode as compared to a sharp receiver tuned in for c.w.

Review: VHF for the Radio Amateur

After hearing several of my friends praise W6AJF's book, *VHF For The Radio Amateur*, I could not help but to rush out and buy a copy. I then proceeded to read it from cover to cover (couldn't put it down!). From our rather one-sided u.h.f. point of view, I was pleasantly surprised with what this book had to offer *me*. We concur heartily with Frank's comments on collinear array antennas, having used a collinear here at K2UYH for some period of time. The transmitter section, though, was what made me really light up . . . Never before had we seen a 1296 mc transmitter in print, and here we had two to choose from! The flat-line unit really looks simple to build. The converter section is also excellent. Frank's idea of running 416B's with out-forced air cooling is sure to prove invaluable with these tubes becoming available to the general ham public. Frank has a whole section on parametric amplifiers for the fellows whose interest lies in that direction. This is the first v.h.f. book that deals so thoroughly with u.h.f., as well as v.h.f. and it truly warrants the attention of all v.h.f. operators. Editor Bob informs me that these books are available at $3.50 postpaid from Hal Weisner, WA2OBR, at *The VHF Amateur*, 300 West 43rd Street, New York 36, New York. Order your copy today. *And a really fine job, Frank!*

UHF and Math?

A horrified expression and a high pitched cry, "Math?" This typifies the attitude all too many amateurs have toward mathematics. Most of these same hams have had a good background in math, far in excess of any necessary to master the simple equations presented from time to time in this column. Then why all the fuss?

One can derive great pleasure in building his own equipment, but just think how much more is gained by building *and designing* your own gear! This is where simple mathematics comes in.

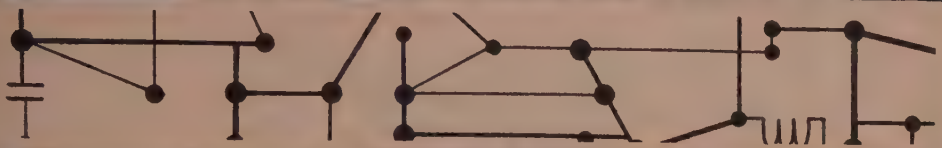
Where Are The Activities?

You have probably noticed that this column has concentrated primarily on the activities side of the u.h.f. picture. This month the column was sort of a one-man effort. We could, I suppose, say that it was due to our holding up the news for a month, but to be frank, *we had none!* As we announced last month, big long-form *U.H.F. Reporting Forms* are available. Let's make use of them! We'd like to have letters, and pictures letting us know what you've been doing. How about it?

73, Allen, K2UYH

*48 Cumberland Avenue, Verona, New Jersey.

the answerman



KEN PHILLIPS*, K8CHE

IF I use a rig designed around a 50 mc crystal, won't I eliminate a lot of possibilities for TVI?"

—J. C., Beverly Hills, Calif.

This does *appear* to be a good idea, but in some cases it doesn't work out too well in actual practice. I think the claim goes, "straight through in the final . . ." But the stability of those little rocks is directly related to the power level of their operation. Since some people are trying to eliminate tubes, their overtone rocks are operated at a rather high power level. This, plus the fact that there is no buffer stage between the final and the oscillator, makes the output signal about as much f.m. as a.m.! You can check this, Johnny, the next time you hear one of these rigs, by tuning off to the side of the carrier. Note how the audio is clear and distinct . . . and contains more "highs." You are now slope-detecting the f.m. Now tune to the dead center of the carrier (if he hasn't gone QRT by this time). Note the different, sometimes muffled, audio. This is a mixture of a.m.—f.m. This is the sort of thing that the FCC frowns on. In fact, it is mentioned in their rules and regulations!

To use 50 mc crystals it will be necessary to operate them at a low level. To have adequate drive for the final, it will be necessary to add one or more buffer-amplifier stages. Since these stages are amplifiers and operating on the same input-output frequency, they will be very prone to self-oscillation. So, if you build a rig like this and do not use the best of interstage shielding and possibly even neutralize each stage, you'll have many different frequencies in the output . . . and surely at least one will be in the TV band! So, why don't you try conventional circuitry, and get adequate drive for the final? And of course that is supposed to lead into the next question . . .

Rock 'n Roll Oscillations on VHF

"Doesn't overdriving the final in my transmitter cause spurious oscillations?"

—G. P., Vancouver, Canada.

Of course the answer to that question is a big fat YES . . . but . . . what is the amount of grid drive that caused the final to be overdriven? Doesn't the final have a better chance to oscillate at another frequency if it is not getting adequate drive on the frequency you want? Is the final an *r.f. generator, or an r.f. amplifier?* Now that I've answered your question with more questions, perhaps I'd better answer my questions with answers before this whole mess gets out of hand.

First, the amount of grid drive the the final requires depends upon the tube and the mode of operation that you are using. Very few existing v.h.f. transmitters are capable of generating *enough* drive for the final. This includes practically all the existing home built circuits and some commercial rigs. In fact, the downfall of some commercial kits that I have built is the lack of available drive. Did you ever pull out your crystal and watch your transmitter keep on generating some frequency? Sometimes it is close to the crystal frequency and sometimes it is completely out of the band. But this condition is not noticed when the final is driven adequately with the desired frequency. (The rig should be so re-designed that it will not oscillate without a crystal.) This was pointed out to show that adequate drive will reduce the possibilities of some final getting spurious frequencies.

I think all too many six and two meter boys think that the final is an r.f. generator. If they starved their kids like they starve the final, well, the neighbors would talk. Maybe this is one reason that the neighbors *are* talking . . . about the funny patterns on the one-eyed monster and the funny audio that has absolutely no relation whatever to what Chet Huntley is saying. The amount of grid drive you're using directly affects your modulation capabilities. Have a fellow *VHF Amateur* reader (He reads Brand X? Forget it. He's probably f.m. to start with) near you adjust his drive from a very low level to a good drive level, and note how his modulation changes. Most of the time it probably sounds like he turned his AUDIO GAIN control. Since the final is a "straight through" device with the input tuned to the same frequency as the output, it is capable of self-oscillation, or at least regenerative to almost the oscillation point. This makes us wonder if the large amount of drive shown from some of the 12AT7-type driver setups is really grid drive at all and not really some regenerative current . . . And, finally, before I overdrive myself . . . How accurate is your own metering system? Do you *really* know the amount of grid drive you are getting? *Aha!*

73, Ken, K8CHE

*351 Hillman Road, Akron 12, Ohio.

DX report

DANIEL L. PARNES*, WA2DMQ ROBERT M. BROWN*, K2ZSQ

INSTEAD of the usual editorial here, we've got a few items we'd like to call to your attention. First off, a real nice letter from LU3DCA informs us that he will be visiting the United States in addition to possibly some Central American cities. We'd like to extend a warm welcome to Michael. As many of you know, last year he visited New York City, and K2ZSQ had the extreme pleasure of meeting him. LU3DCA will be stopping in Miami, San Francisco, Los Angeles, Houston, Dallas, and perhaps Phoenix and New Orleans.

Second item on the agenda is some news from *CQ*'s VHF editor, Don Stoner, W6TNS. Don was operating under the call HR1BL on 50.7 mc during the week of October 21-27 from Honduras. Using stacked rhombics on a mountaintop (gain 20 db) beamed toward Texas, he heard a few fragments of signals, but no real contacts. Don would appreciate any possible reception confirmations sent to him. During January W6TNS will again be operating 6 meters from Central America using (this time) a Communicator IV, v.f.o. and a collapsible yagi. You boys down Texas way — be on the lookout!

And last but not least, the East Coast VHF Society of New Jersey will be holding its gala annual dinner and hamfest at 7:30 PM EST, Saturday, February 23. Don't miss it! Get your tickets today by writing to Jack Tompkins, K2HHS, 135 Herbert Terrace, Saddle Brook, New Jersey. Price is $6.00. No tickets at the door.

**The VHF Amateur*, 300 W. 43rd St., New York 36, N.Y.

Some of K3HNP's license plate collection. Dave would like to have more. Do you have some old call letter plates? Write him at: 14 Darkleaf Lane, Levittown, Pennsylvania. All contributions gratefully accepted.

50 Mc Activities

W1: From the rarely-heard state of Maine comes K1NTC in South Berwick. Curt, although using only a five element beam, heard K3CZI in Valley Forge, Pa., on October 3 and 12th for a nice 400 mi. path. WA2WEM, of Brielle, N. J. was heard on the 11th of Oct. Getting back to the 3rd, Curt did work WA2FMC, Smithtown, N. Y., and WA2KHX, Bellport, N. Y. *Keep plugging!*
W2: September 16 was a big day for K2JNG in Union City, New Jersey. Walt worked W1VXL (R. I.), W3JZY/3 (Md.), and W4VWH (Va.). A real active VHF'er from Paterson, N. J., is Frank, WA2GWM. He enjoys working groundwave and consistently snags QSO's out of the call area. During September and October Frank worked hams in the following cities: Philadelphia, Levittown, Huntington Valley, Coopersburg, and Glenn Mills (all preceding in Pennsylvania). WA2GWM tries to get on the air as often as possible during weekdays before school and remarks that, "southern N. J. and Philadelphia, as well as Conn. are usually found in there between 6 and 7 AM EST. Maybe some of the fellows could sacrifice a few minutes each day and help contribute to early bird activity." *Well, how about it fellows!*

The Peninsula Amateur Radio Klub, WA2VLR, Bayonne, N. J., just got a new Clegg Zeus and is working out great guns. On October 2Q, WA2LFT/1 in York, Maine, was worked

Here's Hank, W3JMY. From left to right we see a Gonset linear amplifier for 6 meters, Communicator II, and a Tapetone Skysweep receiver. Hank slams a real *wallopaloozer* into the greater N. Y. area.

by WA2VLR with a 59 signal . . .

W4: Believe it or not, WA4GDC, of Sebring, Florida, worked *eight* call areas on October 28! Starting at 2100 EST Kris worked 13 states, hearing 16. Other band openings, says Kris, "were on the 13th, when I worked WA2MVO in N. Y. On the 6th I worked into Texas and Tenn; the 4th brought Texas again plus La . . . and on October 15, Md. and Pa. were heard with W3AY being the strongest. *Wow! I think I'm moving to Florida!* On the Sept. 17th opening, W4IMX, Nashville, Tennessee, slammed a signal into Mary Ester, Florida and worked W4SXI. The rest of W4IMX's activity has been confined to hopping around the state and sometimes crossing the border into Kentucky.

W8: Once again, Vince, K8REG, reports the activities of his station. Vince's contacts have been primarily of a "local nature." The farthest contact was only 215 miles. *Some "local nature!"* The station? WA8BBG in Youngstown, Ohio. Others in W.Va., and Mich. in addition to those in the Buckeye State.

From the automobile capitol of the world, Detroit, Michigan, W8MBA, heard weak signals from stations in Mass. On October 10, 11, 12. Unfortunately none were worked. *Better luck next time.*

W9: W9VPP (La Crosse, Wisc.) says that "the band has been extremely quiet during Sept." W9VPP worked into Minn. on the 9th (Sept.) by having QSO's with WØANH, WAØABG, and KØDTA.

WØ: This is the way it happened: WØPFP in Ames, Iowa, was working KØKPG on Oct. 6 at 2036 CST. There is a breaker on frequency. It turns out to be (and this is no misprint) W6QCV in Arcadice, Calif. Sooo, now we have a three-way. But not for long, because at 2045 CST there is another breaker. This time it's K6SUE in Glendale, Calif. *Let's face it. Some guys have all the luck.* The next day (Oct. 7) K8CBD in Ohio was worked via aurora by WØPFP.

Moving along south to Mo., WØCMI worked an 1100 mile path on Sept. 30 to work K4OCK in Miami, Fla. WØCMI gave K4OCK a 25-over 9 report!

WØDLL from Grand Island, Nebr. writes, "Conditions here have been very poor in the midwest during the month of September. Groundwave has been limited to less than 100 miles and "E" skip and inversion conditions have been almost non-existent. I have recently built and completed a two nuvistor pre-amp. Should be able to report more activity in coming months. *We shall be waiting to hear from you again, Bob.*

144 Mc Activities

Reports are down this month and a call area listing would have more "vacancy" signs out front than occupants. Let's get on the ball next time and fill in those READER REPORTS, eh?

Waterbury, Conn: Walt Belsito, K1RTS, comes through with his New Year's greetings . . .

"No DX during Sept. (sob). Worked

BACK ISSUES - 35c

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Work Sporadic-E Skip?

Write today for your copy of "The Sunspot Story, Cycle 19, The Declining Years," by CQ's own W3ASK and Stanley Leinwoll. Send $1.00 to Hal Weisner, WA2OBR, c/o The VHF Amateur, *300 W. 43rd Street, New York 36, N. Y.*

In The Works

"Care and Feeding of TV Rotators," concerning how your TV rotator works and how to keep it in good order. Author: Mike Karr, W3JJY.

"Getting Along with the Indians,"—Part II.

"Complete 6 Meter SSB Transmitter," simple but effective way to get on sideband with a 2E26, by K9SFX and K9EID.

"Understanding Pulse Modulation," a ham's language article on v.h.f. applications of pulsed emission, by WA2TQF.

Read *The VHF Amateur*—published exclusively for the v.h.f. enthusiast.

WA2ONO/1, however, at Mt. Equinox, Vermont, and W3IBH in Penn., the first week. Looking for skeds to N. H. and Maine on 144.65 mc. Sunday mornings. Can you help?" *Sure, Walt. OK youse guys . . . let's flood K1RTS with N. H. and Maine QSL's!*

Westport, Conn: Arnold Olean, K1WHT, emits with . . .

"I have 90 watts plate modulated phone on two meters now and will (I hope) be getting better DX in the future." *That's the way to start the year, Arne.* "Using 9 watts on 144 mc. I did manage to work W3VWX and K2CLW/1 recently. How about some weekend schedules to Easton, Pa.?" *Yes, how about some? K1WHT's address is 157 Imperial Avenue, Westport, Conn.*

Minden, Louisiana: Ernie Brown, W5FYZ, longtime 2 meter "king" of the area, writes . . .

"No luck on Oct. 9 with WA2EMA, N. J., on meteor schedule. Only a few pings and a letter or two from him." *Maybe next year, Ernie. No one seemed to do especially well in the '62 session.* "Speaking of meteor scatter work, it occurs to me that a country-wide standard operating procedure should be adopted. This is not the case now at all, as I have worked m.s. for several years and have picked up 10 or 12 new states via this mode, but the actual exchange of information that should constitute a complete QSO should be established, as some fellows get a little anxious to add a new state when they hear the first few pings and really get with the RRRRR—hi." *You've got a point, Ernie; maybe some of the boys will offer their opinions and we can help get it worked up. Good DX'ing!*

Sign Off

That about wraps it up for this month. Some of you have probably been wondering how this two-man team is working out. Generally speaking, WA2DMQ is doing our 6 meter news and K2ZSQ is doing the 144 mc. stuff. So there you are! Now flip to the READER REPORT and mail it *today!*

73, Dan, WA2DMQ
Bob, K2ZSQ

Reader Reporting Form

Fill Out Now! **Month of December, 1962**

This form serves as the basis for our DX REPORT column in *The VHF Amateur*. Your participation in this program is of utmost importance, for without news-activities reports from you, we cannot provide a truly comprehensive column. *Deadline:* January 20, 1963. Return this form to: DX REPORT, *The VHF Amateur*, 300 West 43rd Street, New York 36, N.Y.

Your name ..... Call .....

Address ..... City ..... State .....

This report covers my 6 2 220 432 (circle one) activities for the period. Enter only one band's activities on this form. Extra forms free upon request. (S.A.S.E. please.)

Antenna (number of elements and type) .....

Best DX During December

Date	Time	Call	Location	Sig. Rpt.

Sked Box Listing: Do you desire schedules to a particular area? (Give state.) .....

.....

Do you presently hold skeds? (List calls, times, days and frequencies) .....

.....

Approximate distance of longest contact made this month (give details: call, number of miles, day, *etc.*) .....

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"I am very delighted with the first V80 and want another for a different location." A. C., California.

CASE HISTORY #159

"I ordered a Gotham V40 Vertical Antenna and found it so successful that several others are wanting them too. Will you please send me four more." W. A., Alaska.

CASE HISTORY #248

"I just wanted to let you know how pleased I am with my Gotham V80 antenna. I have worked a W.A.S. of 46/43, a WAC of 3/3, and DXCC of 14/12 in about 12 months." G. W., Maryland.

CASE HISTORY #111

"The V160 did a beautiful job on a VE1 for me. Also, I forgot to take it down during the hurricane of last week. It is just as straight as it was when I bought it." D. S., New Jersey.

CASE HISTORY #250

"I have one of your vertical antennas and have been having fine results on 10, 15, and 20 meters." N. S. P., Missouri.

CASE HISTORY #613

"I have never been happier with any antenna than I have been with the V80. I have worked all bands with it and have had tremendous success—i.e., DL4s, ZS3, etc., all solid copy." R. D. S., Penna.

CASE HISTORY #483

"My V80 is working wonders. I am able to maintain a 1:1 SWR all across the 40 meter band. After many years on 10, 15, and 20, the XYL and I are getting great kicks out of some oft he lower bands." J. A., New Mexico.

CASE HISTORY #123

"I am full of praise for your vertical. In the recent field day, we went up to the mountains near here and QSO'd a KA2, KZ5, and an XE at 2100 PDST on 15 meters. We got a 59 plus from the KA and KZ and 58 from the XE." D. P., Nevada.

CASE HISTORY #398

"Some months ago I purchased one of your V80 vertical antennas. I have had wonderful results with this antenna, and I think it was of far greater value than the small amount I paid for it." R. C., Utah.

CASE HISTORY #766

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For further information, check number 12, on page 126

NOVICE [*from page 78*]

not nice to break New Years resolutions but I will enjoy *CQ* even more since it will also contain *The VHF Amateur*. So thanks for a nice column, keep it up. 73, Roy W. Salmonson, WA6YAL, 309 Coronado Street, El Cerrito 8, California."

No comment, enough said; "Go ye and do likewise."

"Dear Mr. Burdine: If you recall, I wrote you before and you were kind enough to put my name in the Help Wanted Column.

"I would like to thank you and all those who answered and tried to help me with my license and to get my transmitter going. Thanks again. 73, Stephen Clifton, WV2TYF."

Bob Lindsey, WN8EOZ, 218 Enterprise, Bryan, Ohio, sends this note:

"Dear Walt: I enjoy your Novice articles in *CQ* very much and just finished reading the last issue. I feel rather proud of the work I have been doing as a Novice and decided to write you about it.

"First of all I will tell you about myself. I am 39 years old, married and have two children. I am a police officer for the City of Bryan, a city of about 8,000. Other hobibes are U.S. stamps, tropical fish and I am area photographer for the Toledo Blade.

"I received my license June 21st and was on the air two days later, having built a Viking Challenger, erected a 40 meter dipole and purchased a used Hammarlund HQ-100. I have recently erected a Hornet V-75 Vertical strictly for 80 meters, but my first love is 40 meters.

"In the first 50 days of operation I have contacted 32 states, have 24 confirmed and had 3 Canadian contacts. I have about 100 QSLs, QSL 100% and keep a card file for this purpose. I have my code speed up to 9 or 10 w.p.m. and hope to take my General soon. I love the Novice bands and am sure that I will work them quite often after the General comes. I have enjoyed working people from an 11 year old YL to a middle aged college math professor and a NASA electronics technician. My thanks to WA2RSE for nomination to RCC. Thanks again and 73 Bob."

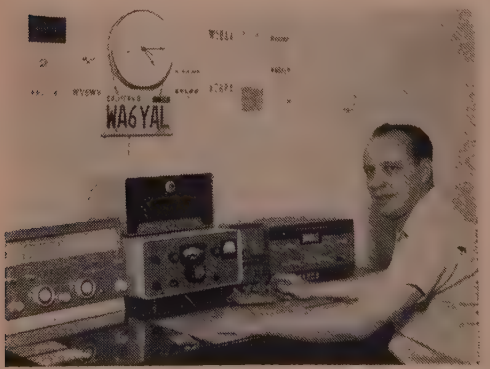
Jim Morgan, W9PRJ, 805 East Evans, Valparaiso, Indiana has a new kind of problem:

"Dear Walt: I am not a Novice, but would like to take this opportunity to compliment you on your fine column.

"Recently, after many Novices visited the shack, most of them seeemed disappointed that it does not look like a division of the BBC. I must admit that this causes me great concern.

"I've been on the air for almost 15 years and have run everything from a 1 watter to 2 kw p.e.p. s.s.b. with 51J-3s and rhombics and beams but always seem to come back to the old reliable 25 watt c.w. rig and an inverted V on 40 meters.

"The current rig is a 6L6-6L6 and the receiver is a highly modified CR-5AC and an inverted V antenna. Not much by any means but adequate for many hours of pleasant operating.



Taking the s.w.l. route makes a lot of hams. That Smile of Roy W. Salmonson, WA6YAL, El Cerrito, California proves that he is happy with the results.

"Walt, please help me to try to convince these guys that its not what you have but how you use it that counts. 73, Jim."

Well, Jim you really don't have a problem. You are having fun from your rig and its nobody's business if you enjoy low-power and simple rigs. I myself enjoy low-power and similar operating habits. I stress the fact to all who visit that my rig has taken more work than those nicely built rigs the other fellow has but that if I burn out a component I can replace it with something from the junk box and not miss out on the QSO and not have to wait for a month for the factory to send a replacement part. I have worked 113 countries on low power phone and only need two QSL for DXCC. I know its easier to go buy a rig and get it working or return it to the parts house for repair but by golly I enjoy rolling my own. Those folks will see the light someday and then they too will get more out of ham radio.

I had just such a visitor last month, you see I run about 4.4 watts on two meters with only 80 volts of a.c. His statement: "You mean you haven't missed a day with *that* equipment." You see I have made a v.h.f. QSO every day for 92 months plus for a total of 2780 days. Yes, you *can* do things with low power and persistence.

R. L. Turner, WN4HRG, 118 McKinney Avenue, Rogersville, Tennessee says: "Dear Walt: I have been reading *CQ* and your articles for quite a while and thought I would let you know how much I like it. I got my ticket in late May but did not get on the air until about the second week in June. To date, I have had 145 QSOs in 16 states (14 on 80) but only 14 are confirmed.

"I have a Heath HX-11 and a National NC-155 running into an inverted V antenna. When I started I used a Heath GR-91 and worked Michigan on 80 despite its natural drawback (whadda want for 40 bucks anyway). I don't have much DX, unless you count Colorado on 40 and Michigan, Pennsylvania and Oregon on 80. The Oregon QSO was at 0630 by the way.

"My age is 16, and going to school and working on Saturdays cuts down on my QSOs. Enclosed is a picture of Martin, K4VIC, my hero, at the controls of my station. Martin loaned me the Globe Chief after an OO, the FCC, the Department of Transport and I had a run-in about harmonics. Many, many thanks to him for keeping me on the air. Keep up the good work, Walt and if you have the space for it, I would like to see a simple break-in system described in your column. I have RCC and will schedule anyone needing a good Ragchew."

Help Wanted

If you need help in practicing the code or in getting the theory or in finding someone to give you the test, write me all the information and I will try to find some one to help. A number of our readers have written asking for the name of a number of hams in a particular town or for the name of some one in a town, I have no way in checking for such information unless I have contacted a ham in that town. Another thing, the only way I can give you the name of a radio club in your town is to read the name from the magazine when they tell about field day activities or activity in some event or emergency. I would like to be able to give you this information but it is almost an impossibility. I'll do anything I can to help you get more enjoyment from ham radio.

N. P. Shutak, 1211 Dorothy Street, Lakeland, Florida can use some help.

Some one forgot to sign his name but needs help with the code and some one to give him the test. His address is 394 East 54th Street, Brooklyn 3, New York. Phone DICKENS 6-9721. You know him?

Larry Johnson (13), 5305 Walton Drive, Klamath Falls, Oregon, needs help with code and theory for the Novice license. Larry, look up the radio club there and they should be able to help you. My atlas says Klamath Falls has about 20,000 population, they should have an active radio club and a training program.

Well that about winds it up for this month except to wish that old Santa brought you the things that you need to make 1963 the best of all.

73, Walt, W8ZCV

THE HAMS AT HARVEY SAY:

STEP UP TO *hallicrafters*

MODEL SR-150 TRANSCEIVER

Amateur Band • Fixed/Mobile

Here's top transceiver performance with full amateur band coverage — 80 through 10 meters • Receiver AF gain and RF gain controls • SSB operation — VOX or PTT; CW operation — manual or break-in • R.I.T. (Receiver Incremental Tuning) — ± 2 kc adjustment of receiver frequency independent of transmitter • Exclusive new AALC (amplified automatic level control) • 1650 kc crystal filter.

Model SR-150 ..... **$650.**

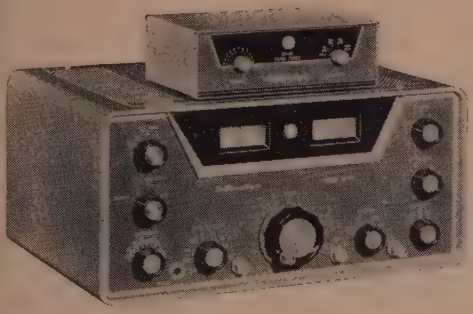
ALSO: AC or DC Power Supplies

P-150 AC Styled to match SR-150 Transceiver. Five silicon diode rectifiers. PM speaker **$99.50**

P-150 DC Five silicon diode rectifiers, four transistors **$109.50**

Complete Mobile Mount:

MR-150 Adaptable to transmission hump or floor. Easily mounted **$39.95**



MODEL SX-117 RECEIVER

A new versatile highly stable Hallicrafters communications receiver! It's a triple conversion heterodyne type with crystal-controlled high-frequency oscillator on all ranges • Crystal-controlled 1st and 3rd conversion oscillators • Selectable side bands • Constant tuning rate • Can operate on most frequencies from 3 MC to 30 MC with proper crystals; with accessory unit HA-10 (shown on receiver) can be extended downward from 3 MC to 85 KC • Selectivity variable in 3 steps from 500 to 5,000 cycles • V.F.O. can be used as crystal locked oscillator.

Model SX-117 ..... **$379.95**

Accessory HA-10 ..... **$24.95**

FOR FURTHER INFORMATION WRITE TO:

HARVEY RADIO CO., INC.

103 West 43rd Street, New York 36, N. Y. 1 Block from Times Square / JUdson 2-1500

sit our new subsidiary, FEDERAL ELECTRONICS, INC., Vestal, N.Y. for all your industrial needs.

For further information, check number 39, on page 126

Propagation [*from page 63*]

CQ SHORT-SKIP PROPAGATION CHART

January & February, 1963

Band Openings Given in Local Standard Time

AT PATH MID-POINT (24-Hour Time System)

Band (Meters)	*50-250 Miles*	*250-750 Miles*	*750-1300 Miles*	*1300-2300 Miles*
10	*Nil*	*Nil*	10-15 (0-1)	08-10 (0-1) 10-15 (1-2) 15-17 (0-1)
15	*Nil*	10-16 (0-1)	08-09 (0-1) 09-10 (0-2) 10-15 (1-3) 15-16 (1-2) 16-18 (0-1)	06-08 (0-1) 08-09 (1-3) 09-10 (2-3) 10-15 (3-4) 15-16 (2-3) 16-18 (1) 18-19 (0-1)
20	*Nil*	08-10 (0-1) 10-14 (0-3) 14-16 (0-2) 16-18 (0-1)	06-07 (0-1) 07-08 (0-2) 08-10 (1-4) 10-14 (3-4) 14-16 (2-4) 16-18 (1-2) 18-19 (0-2) 19-21 (0-1)	06-07 (1) 07-08 (2) 08-10 (4) 10-14 (4-3) 14-16 (4) 16-17 (2-4) 17-18 (2-3) 18-19 (2) 19-21 (1)
40	07-08 (0-1) 08-09 (1-2) 09-10 (2-4) 10-16 (4) 16-17 (3) 17-19 (1-2) 19-21 (0-1)	07-08 (1-2) 08-09 (2-3) 09-11 (4) 11-15 (4-3) 15-17 (3-4) 17-19 (2-3) 19-21 (1-2) 21-02 (0-2) 02-07 (0-1)	07-08 (2) 08-09 (3-1) 09-11 (4-1) 11-15 (3-1) 15-17 (4-2) 17-19 (3-4) 19-22 (2-4) 22-02 (2-3) 02-07 (1-2)	07-08 (2-1) 08-15 (1-0) 15-17 (2) 17-19 (4-3) 19-22 (4) 22-02 (3-4) 02-04 (2-3) 04-07 (2)
80	07-08 (1-2) 08-09 (3-4) 09-19 (4) 19-21 (3-4) 21-23 (2-3) 23-03 (1-2) 03-07 (1)	07-08 (2) 08-10 (4-2) 10-14 (4-0) 14-16 (4-1) 16-18 (4-2) 18-21 (4) 21-23 (3-4) 23-03 (2-3) 03-07 (1-3)	07-08 (2-1) 08-10 (2-0) 10-14 (0) 14-16 (1-0) 16-18 (2-1) 18-20 (4-3) 20-23 (4) 23-05 (3) 05-07 (3-2)	07-08 (0-1) 08-16 (0) 16-18 (1-0) 18-20 (3-2) 20-23 (4) 23-03 (3) 03-05 (3-2) 05-07 (2-1)
160	09-17 (1-0) 17-19 (3-2) 19-05 (4) 05-07 (3-2) 07-09 (2-1)	17-19 (2-1) 19-21 (4-2) 21-04 (4) 04-05 (4-3) 05-07 (2-1) 07-09 (1-0)	17-18 (1-0) 18-19 (1) 19-21 (2-1) 21-04 (4-3) 04-05 (3-2) 05-06 (1) 06-08 (1-0)	18-20 (1-0) 20-21 (1) 21-01 (3-2) 01-03 (3) 03-04 (3-2) 04-05 (2-1) 05-07 (1-0)

HAWAII TO:

*Openings Given in Hawaiian Standard Time**

TO:	*10/15 Meters*	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	08-13 (1)† 06-08 (1) 08-12 (2) 12-15 (3) 15-16 (2) 16-17 (1)	06-08 (2) 08-12 (1) 12-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	17-19 (1) 19-21 (2) 21-00 (3) 00-03 (2) 03-04 (1)	19-21 (1) 21-01 (2) 01-03 (1) 23-03 (1)‡
Central USA	07-09 (1)† 09-12 (2)† 12-14 (1)† 06-07 (1) 07-08 (2) 08-13 (3) 13-15 (4) 15-16 (2) 16-18 (1)	06-07 (1) 07-10 (2) 10-13 (1) 13-14 (2) 14-17 (3) 17-18 (2) 18-20 (1)	17-19 (1) 19-20 (2) 20-03 (3) 03-04 (2) 04-06 (1)	19-20 (1) 20-22 (2) 22-01 (3) 01-03 (2) 03-05 (1) 00-04 (1)‡
Western USA	09-11 (1)† 11-14 (2)† 14-16 (1)† 06-07 (1) 07-08 (2) 08-14 (4) 14-15 (3) 15-16 (2) 16-18 (1)	06-07 (2) 07-10 (4) 10-14 (3) 14-16 (4) 16-17 (3) 17-18 (2) 18-20 (1)	16-18 (1) 18-19 (2) 19-22 (4) 22-02 (3) 02-04 (2) 04-09 (1)	19-20 (1) 20-22 (2) 22-04 (3) 04-05 (2) 05-07 (1) 22-05 (1)‡

*Hawaiian Standard Time is 5 hours *behind* EST; 4 hours *behind* CST; 3 hours *behind* MST and 2 hours *behind* PST.
†Indicates possible 10 meter openings.
‡Indicates possible 160 meter openings.

ALASKA TO:

Openings Given in Alaskan Standard Time§

TO:	*10/15 Meters*	*20 Meters*	*40 Meters*	*80/160 Meters*
Eastern USA	09-11 (1) 11-13 (2) 13-14 (1)	07-13 (1) 13-15 (2) 15-17 (1)	21-04 (1)	*Nil*
Central USA	11-14 (1)† 10-13 (1) 13-15 (2) 15-16 (1)	08-14 (1) 14-16 (2) 16-18 (1)	(22-04 (1)	*Nil*
Western USA	11-15 (1)† 10-13 (1) 13-15 (2) 15-17 (1)	09-11 (2) 11-16 (3) 16-17 (2) 17-19 (1)	23-06 (2) 06-07 (1)	01-06 (1)

Forecast Ratings

The numerical ratings appearing in parenthesis following each predicted time of opening indicate the *total* number of days during each month of the forecast period that the opening is expected to occur, as follows:

(1) Less than 7 days; (2) Between 8 and 13 days; (3) Between 14 and 22 days; (4) More than 22 days.

On the Short-Skip Propagation Chart, where two numerals are shown within a single set of parenthesis, the first applies to the shorter distance for which the forecast is made, and the second to the longer distance.

For the *specific* days of each month on which a particular opening is most likely to occur, as well as a day-to-day forecast of reception conditions (signal quality, noise and fading levels), see the "Last Minute Forecast" which appears at the beginning of this column.

All times are shown in Local Standard Time, using the 24-hour time system. In this system midnight is shown as 00, 01 is 1 A.M., 02 is 2 A.M., etc. Noontime is shown as 12, 13 is 1 P.M., 14 is 2 P.M., etc.

The *CQ Short-Skip* Propogation on Charts are based upon a CW effective radiated power of 75 watts from a half-wave dipole antenna, a half-wave or higher above ground. The Charts are valid through February 28, 1963. These forecasts are based upon basic propagation data published monthly by the Central Radio Propagation Laboratory of the National Bureau of Standards, Boulder, Colorado.

§Alaskan Standard Time (from Skagway to 141° west longitude), is 4 hours *behind* EST; 3 hours *behind* CST; 2 hours *behind* MST and 1 hour *behind* PST.

Air-to-Ground Phone [*from page 41*]

Mrs. Harrison as soon as possible. The nurse acted kind of funny about it but said she would do so.

"I thought when I hung up that telephone that I had heard the last of that little bit of radio relaying work, but I was mistaken. I sure was wrong!"

"Why," Dick interrupted, "What happened? Come on, finish it, I gotta know the rest of that yarn now!"

I ignored his needling and continued, "The rest is almost a 'Believe It or Not' but here it is! Mind you, that bomber incident happened in 1924. Late in the '30s, my mother, who still lived in Indianapolis, was at a women's garden club party. During the conversation with some of the ladies, something was said about amateur radio. One of the ladies related how, when she was lying almost at the point of death, an amateur had relayed a message from her hus-

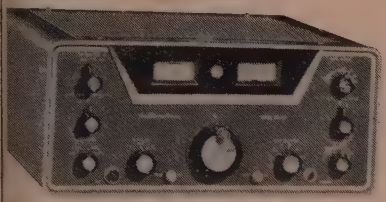
[*Continued on page 110*]

$5.00 DOWN ...UP TO 3 YEARS TO PAY

rry W9DIA—"King of Traders"

Terry has it! Hallicrafters New SR-150 Fixed/Mobile Transceiver

Yours for $5.00 Down — Only $23.29 a Month



Eight-band capability—full coverage provided for 80, 40, 20, 15 meters plus one segment of 10M. **Front panel controls:** Tuning; Band Selector; Final Tuning; R.F. Level; Mic. Gain; Pre-Selector; R.I.T.; Rec. RF Gain; AF Gain; Operation (Off/Standby/MOX/VOX); Function (CW/USB/LSB); Cal. **General:** Dial cal., 5 kc; 100 kc crystal cal.; VFO tunes 500 kc; 18 tubes plus volt. reg., 10 diodes, one varicap. Rugged, lightweight aluminum construction (only 17½ lb.); size—6½" x 15" x 13". **Transmitter Section:** Power input—150W P.E.P. SSB; 125W CW. Carrier and unwanted SSB suppression 50 db. **Receiver Section:** Sensitivity less than 1 uv for 20 db. signal-to-noise ratio. Audio output 2W; overall gain, 1 uv for ½W output. 6.0-6.5 1st I.F. (tunes with VFO). 1650 kc 2nd I.F.

Ham Net $650

P-150 AC Power Supp.	$ 99.50
P-150 DC Power Supp.	109.50
MR-150 Mobile Mount	39.95

NEW HALLICRAFTERS EQUIPMENT

	Amateur Net Price	Monthly Payments
CRX-1 30-50MC Receiver	$ 99.95	$ 3.42
CRX-2 151-174MC Receiver	109.95	3.79
CRX- 3108-135MC Receiver	94.95	3.24
FPM-200 Transistorized Transceiver	2,650.00	95.51
HA-1 "To" Keyer	79.95	2.70
HA-2 2 Meter Transvertor	349.50	12.44
HA-5 80-2 Meter VFO	79.95	2.70
HA-6 6 Meter Transvertor	349.50	12.44
HA-10 Tuner	24.95	.76
HTHT-32B SSB Transmitter	725.00	26.00
HT-33B Linear Amplifier	995.00	35.75
HT-37 SSB Transmitter	495.00	17.69
HT-40 AM-CW Transmitter	109.95	3.79
HT-40K Kit form of above	89.95	3.07
HT-41 Linear Amplifier	395.00	14.08
P-26 Supply for Transvertors	99.50	3.41
R-47 Speaker	12.95	.29
R-48 Speaker	19.95	.54

	Amateur Net Price	Monthly Payments
S-108 General Coverage Receiver	$ 139.95	$ 4.87
S-118 General Coverage Receiver	99.95	3.42
S-119 General Coverage Receiver	49.95	1.62
S-119K Kit form of above	39.95	1.26
S-120 General Coverage Receiver	69.95	2.35
SR-150 Fixed/Mobile Transceiver	650.00	23.29
P-150AC Supply for SR-150	99.50	3.41
P-150DC Supply for SR-150	109.50	3.77
MR-150 Mobile Mount for SR-150	39.95	1.26
SX-62A FM & Short Wave Receiver	430.00	14.08
SX-100 General Coverage Receiver	325.00	11.56
SX-101A Ham Band Receiver	445.00	15.89
SX-110 General Coverage Receiver	169.95	5.86
SX-111 Ham Band Receiver	279.50	9.91
SX-115 Ham Band Receiver	599.95	21.48
SX-117 Ham Band Receiver	379.95	13.54
SX-140 Ham Band Receiver (80-6)	124.95	4.33
SX-140K Kit form of above	104.95	3.61

HALLICRAFTERS RECONDITIONED EQUIPMENT

X-2 Recv.	$ 74.00	SX-62 Recv.	$149.00
-5 VFO	59.00	SX-71 Recv.	119.00
20R Recv.	49.00	S-76 Recv.	79.00
-25 Recv.	59.00	S-77A Recv.	49.00
-28 Recv.	99.00	S-85 Recv.	79.00
-31 Linear	129.00	SX-96 Recv.	159.00
-32 Xmtr.	369.00	SX-99 Recv.	89.00
-33A Xmtr.	429.00	SX-100 Recv.	189.00
-33A Linear	399.00	S-106 Recv.	39.00
-37 Xmtr.	349.00	S-108 Recv.	89.00
38E Recv.	34.00	SX-110 Recv.	119.00
-40 Xmtr.	64.00	S-119 Recv.	29.00
40 Recv.	49.00	S-120 Recv.	39.00
40A Recv.	59.00	SX-140 Recv.	79.00
40B Recv.	69.00		
-42 Recv.	139.00	CITIZENS BAND	
-43 Recv.	89.00	CB-1 Transcvr.	59.00
53 Recv.	49.00	CB-3 Transcvr.	89.00

NEED CASH? We'll buy your ham gear for spot cash. Tell us what you have to sell and we'll rush our offer.

STAY ON THE AIR PLAN

Yes—Now you can enjoy your new Hallicrafters equipment without going off the air. You need not ship your trade-in in to us until you receive our shipment, and make sure that your new merchandise is in good working condition.

INFORMATION ON FINANCING

Only $5.00 down is required for any New Hallicrafters Equipment. 10% is required for reconditioned equipment. Payments shown on new equipment are for a 36 month plan. A $60 order for either new or used equipment, may be financed up to one year, two years on a $120 order, or three years on $180 order. If you do not already have one of our Credit Cards, to speed your order you should supply us with the credit information when you send in your down payment. See page 108 of this magazine. Persons purchasing on our time payment plan must be of 21 years of age and regularly employed. Service men with APO addresses with good credit ratings, accepted.

AMATEUR ELECTRONIC SUPPLY

THREE STORES TO SERVE YOU

Please send mail orders to Milwaukee Store

3832 West Lisbon Ave., Milwaukee 8, Wis. • PHONE WEST 3-3262

CHICAGO 31, ILL.
6450 Milwaukee Ave.,
PHONE RO 3-1030

ORLANDO, FLORIDA
23 Azalea Park
Shopping Center, Phone 277-8231

Send all mail orders and inquiries to CM-1
AMATEUR ELECTRONIC SUPPLY
3832 W. Lisbon Ave., Milwaukee 8, Wisc.

Ship me .....
I enclose .....: I will pay the balance in
☐ 1 year ☐ 2 years ☐ 3 years
If new account — enclose credit information — see page 108 for details.
I want to buy .....and want to trade
.....What's your deal?

Name .....

Address .....

City .....Zone.....State .....

☐ Send reconditioned equipment and sale bulletin.

For further information, check number 5, on page 126

Tri-Ex

BUY THE FINEST TOWER MADE — BUY TRI-EX!
THERE IS A TRI-EX TOWER TO FIT YOUR ANTENNA REQUIREMENTS

Tri-Ex

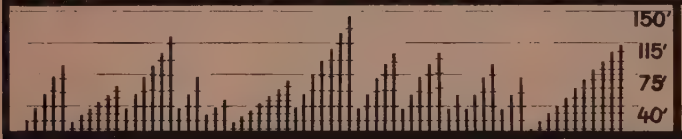
NOW! NEW LOWER PRICES ON ALL GUYED TOWERS!

EXAMPLE: TRI-EX H AND HS SERIES GUYED TOWERS WITHSTAND HEAVY WIND LOADS WITH REALLY BIG ANTENNAS TOPSIDE!

- IRON PHOSPHATE RUST PROOF UNDERCOATING PLUS EPOXY RESIN PRIMER AND BAKED ENAMEL FINISH COAT (GALVANIZED AT SLIGHTLY HIGHER COST)
- ACCOMMODATES ALL PROP PITCH AND OTHER ROTOR MOTORS INSIDE TOP SECTION
- HEAVY DUTY CRANK-UP EQUIPMENT

MODEL NO.	HEIGHT (ft.)	WEIGHT (lbs.)	NEW LOW PRICE
H-237	37	150	$140.00
H-354	54	250	190.00
H-471	71	365	270.00
HS-237	37	200	175.00
HS-354	54	305	240.00
HS-471	71	440	343.00
HS-588	88	620	475.00
HS-6105	105	870	745.00

GUY CABLE, PLATES, CLAMPS, ANCHORS, ETC. AVAILABLE IN KIT FORM AT LOW ADDITIONAL COST.



SEND FOR THE NEW TRI-EX ANTENNA TOWER SELECTOR CHART

TRI-EX TOWER CORPORATION / 127 EAST INYO STREET / TULARE / CALIFORNIA / MU 6-3411

For further information, check number 35, on page 126

B&W

COAXIAL TYPE SWITCHES

. . . multi-position, single or multiple gang

Now you can switch coaxial line circuits quickly and without error. These handy, inexpensive units are available with "UHF", "BNC", "N" and Phono type connectors for use with either 52 or 75 ohm lines. Phono connector types are specific for Hi-Fi applications. Other types are designed to handle RF Power up to 30 MC, 1 KW input.

Stock items ready for shipment are:

Model 550A—Single gang, single pole, 5 position switch with UHF connectors. Price: $8.25 each.

Model 551A—Single gang, 2 pole, 2 position special purpose switch with UHF connectors. Ideal for switching any device in or out of series connection in coax line circuits. Price: $7.95 each.

Model 560—Single gang, single pole, 5 position switch, same as Model 550A except with BNC type connectors. Price: $11.95 each.

Model 561—Single gang, 2 pole, 2 position special purpose switch, same as Model 551A except with BNC type connectors. Price: $9.95 each.

Model 570—Single gang, single pole, 5 position switch, same as Model 550A except with N type connectors. Price: $13.35 each.

Model 580—Single gang, single pole, 5 position switch, same as Model 550A except with Phono type connectors. Price: $7.35 each.

Multiple gang types, up to 6 gang for single pole—5 position switches, and as required for 2 pole—2 position switches, are made to order with any connector types listed above. Prices on request.

Barker & Williamson, Inc.

Foreign Sales—Royal National Corp., 250 W. 57 St., N. Y. 19, N.Y.

OTHER B&W EQUIPMENT: Transmitters AM-CW-SSB • Transistorized Power Converters and inverters • Dip Meters • Matchmasters • Frequency Multipliers • Low Pass Filters • T-R Switches • R. F. Filament Chokes • Transmitting R. F. Plate Chokes • Band-Switching Pi-Network Inductors • Cyclometers • Antenna Coaxial Connectors • Baluns • Variable Capacitors • Toroidal Transformers • Fixed and Rotary edgewound Inductors • Plug-in Coils with fixed and variable links • Straight type air wound coils in a variety of dimensions.

For further information, check number 36, on page 126

LAFAYETTE RADIO

SMASHING VALUES! TOP DESIGN!

MADE IN U.S.A.

STARFLITE

KT-390

90 WATT PHONE and CW TRANSMITTER KIT

COMPARE QUALITY!
COMPARE PRICE!

79.50

NO MONEY DOWN

● 90 Watts Phone or CW on 80 Thru 10 Meters ● Built-in 3-Section Low-Pass Filter ● Clear, Chirpless Grid Block Keying

Dollar for dollar you can't beat this new Lafayette Starflite transmitter. Easy to build and operate, it glistens with quality and performance all-over. Features in addition to those listed above: 5 crystal positions and provisions for external, VFO, illuminated edgewise panel meter and pin-net work output for proper antenna match. Buy one now — we know you'll be satisfied with it.

THE LAFAYETTE HE-30

Professional Quality Communications Receiver

99.95

NO MONEY DOWN

● TUNES 550 KCS TO 30 MCS IN FOUR BANDS ● BUILT-IN Q-MULTIPLIER FOR CROWDED PHONE OPERATION ● CALIBRATED ELECTRICAL BANDSPREAD ON AMATEUR BANDS 80 THRU 10 METERS ● STABLE OSCILLATOR AND BFO FOR CLEAR CW AND SSB RECEPTION ● BUILT-IN EDGEWISE S-METER

Sensitivity is 1.0 microvolt for 10 db. Signal to Noise ratio. Selectivity is ± 0.8 KCS at —6db with Q-MULTIPLIER. TUBES: 6BA6—RF Amp, 6BE6 Mixer, 6BE6 OSC., 6AV6 Q-Multiplier—BFO, 2-6BA6 IF Amp., 6AV6 Det-AF Amp. ANL, 6AQ5-Audio output, 5Y3 Rectifier.

NEW LAFAYETTE HE-50A DELUXE 10-METER TRANSCEIVER

MADE IN U.S.A.

114.95

NO MONEY DOWN

- Highly Sensitive Superheterodyne Receiver Section for 28-29.7 Mc
- Effective Series Gate Noise Limiter
- 3-Stage, 12-Watt Transmitter with 2E26 Final
- Illuminated Panel Meter for Plate Current and "S" Readings
- Pi-Network Transmitter Output
- Built-in 117 VAC and 12 VDC Power Supplies
- Push-To-Talk Ceramic Microphone

Provides maximum convenience and flexibility in either mobile or fixed operation.

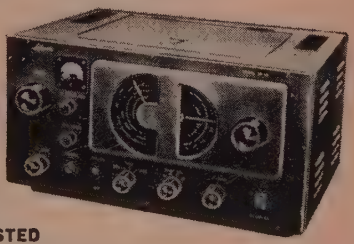
LAFAYETTE HE-45A 6-METER TRANSCEIVER

Similar to above except for 6 meter operation 114.95

TOP VALUE COMMUNICATION RECEIVER

KT-200
in Kit Form
64.50

HE-10
79.95
WIRED AND TESTED



● SUPERHET CIRCUIT UTILIZING 8 TUBES AND RECTIFIER TUBE ● BUILT-IN "S" METER WITH ADJUSTMENT CONTROL ● FULL COVERAGE 80-10 METERS ● COVERS 455KC TO 31 MC ● VARIABLE BFO AND RF GAIN CONTROLS ● SWITCHABLE AVC AND AUTOMATIC NOISE LIMITER

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Here's a low-cost, highly efficient, 18 ft. vertical that can be tuned to any band—10 thru 80 meters—by a simple adjustment of the feed point on the matching base inductor. Designed to be fed with 52 ohm coax, the 18V is amazingly efficient for DX or local contacts. Self-supporting, this radiator which will survive winds up to 50 MPH, may be quickly installed on a short 1⅝" mast driven in the ground. It is also adaptable to roof or tower mounting. Highly portable—knocks down to overall length of 5 ft. A tremendous buy in an antenna with multi-band capability. Priced at **$16.95**

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The world's most popular multi-band, omni-directional antenna. Self-supporting and completely factory pretuned to maintain an SWR of 2:1 or less across the entirety of each band. The 14 AVS features a low angle DX radiation pattern. Thoroughly weatherproof. May be roof top or ground mounted. Height: 21'. Wt.: 10 lbs.

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Ward J. Hinkle, Owner

For further information, check number 32, on page 126

satisfactory driver transformer secondary im pedance may be obtained by multiplying th single transistor input impedance, h_{ie}, by Thus, a pair of 2N456As which each have a input of 16 ohms, may be driven by a tran former with a secondary impedance of 6 ohms.

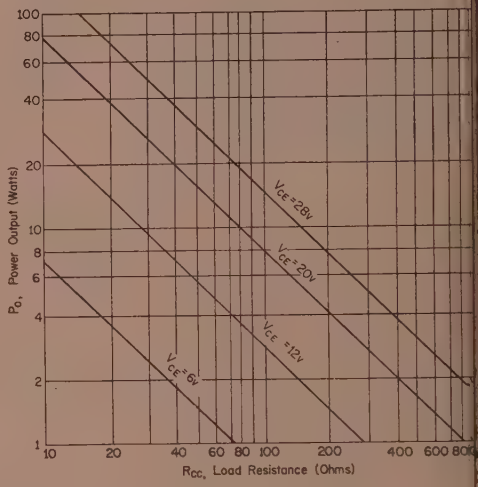

Fig. 15—A load resistance versus power output n mograph helps reduce some calculations.

CORRECT FIXED BIAS—A transistor class amplifier does not operate at cutoff or witho bias. Due to curvature of the characteristics small fixed bias is required. The value must b sufficient to overcome the knee at the botto of the characteristics. Without this bias, si nals would suffer from "cross over" distortio which is particularly noticeable on lower lev signals. Figure 16A shows a tone signal affecte by cross over distortion. The same signal displayed at B with the bias correctly adjuste Generally, a bias causing a current in the r gion of 50 to 100 ma is required. Witho knowledge of transistor characteristics it not possible to be more specific than thi However, bias voltage should be as low as po sible, consistent with distortionless reprodu tion.

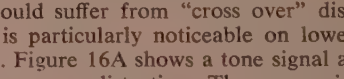

Fig. 16—Signal (A) exhibits "cross over" distorti prevalent in some push-pull class B circuits. A cle output shown in (B) can be achieved with a corre bias.

THE DRIVER—In order to know what is r quired of the driver it is necessary to know th driving power required. The required drivi power is calculated as indicated in formu

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HQ-105TR	Receiver/Transmitter, in cabinet	219.50	19.66	10.72	7.74
HQ-105TRC	Receiver/Transmitter, in cabinet, with clock (24 hr.)	229.45	20.57	11.22	8.10
HQ-105TRS	Receiver/Transmitter, in cabinet with built-in speaker	224.50	20.12	10.97	7.92
HQ-110-AC	Receiver only, in cabinet, with clock	259.00	23.28	12.70	9.17
HQ-145XC	Receiver only, in cabinet, with clock	279.00	25.11	13.70	9.89
HQ-170AC	Receiver only, in cabinet, with clock	379.00	34.28	18.70	13.50
HQ-180C	Receiver only, in cabinet, with clock	439.00	39.78	21.70	15.67
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HX-500	Transmitter in cabinet	695.00	63.25	34.50	24.91
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HK-1B	Transistorized Electronic Keyer	39.95	3.53	1.76	1.26
PL-42900-G1	Noise Silencer (for HQ-170 and HQ-180 receivers only)	33.50	3.00	1.50	1.02

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For further information, check number 2, on page 126

INFORMATION REQUIRED FOR A TIME PAYMENT PURCHASE AT AMATEUR ELECTRONIC SUPPLY

(see our ads in this magazine on pages 103, 107, 109, 115)

Even if you are not ready to make a purchase on credit today, send me the following information on a separate piece of paper. Do not put it in the body of a letter. If you have a message to send us enclose it with the credit application on a separate piece of paper. Once your credit has been ok'ed you will receive an attractive card showing that you are a preferred credit customer. All at no cost to you. List the following information on a separate piece of paper very carefully, accurately, and complete in every detail for quick credit approval:

1. Your full name. Your age. Your Driver's License Number and state in which it is issued.
2. Your wife's name (if any). Her age. Number of children (if any) and their ages.
3. Your complete home address. How long have you lived there? Your telephone number, or nearest phone where you can be reached.
4. List your previous address. How long were you there?
5. If you rent, show the amount of payment. Also name, address, and phone number of landlord.
6. If you own your own home, show the amount of payment (if any). The mortgage holders name, address, and phone number.
7. Show name of employer, his address, and phone number. Your occupation. How long you have been there. Salary by the week.
8. Show previous employer, his address, and how long there.
9. If your wife is employed, show name of employer, address and phone number. Her occupation, and weekly salary.
10. If own a car, show year and model. If it is financed, show by whom and their address.
11. If you own your furniture, state so. If it is being financed, show by whom and their address.
12. List the names and addresses of banks with whom you do business with.
13. List at least five credit references, giving the complete street address, city and state. If you owe anything to these people, show the amount owed, and briefly the items purchased.
14. List at least two relatives and one friend not living with you.
15. Indicate the amount of credit desired and the length of time you desire credit. For instance, $1,000, for 36 months.

Send the above information to speed a time payment purchase to:

AMATEUR ELECTRONIC SUPPLY

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(11). The gain may be calculated as follows:

$$\text{Gain} = \frac{(H_{fe})^2 R_{c\text{-}c}}{4\, h_{ie}} \qquad (13)$$

The above formula is not as formidable as it may appear. The forward current transfer ratio, H_{fe}, or simply the current gain of the transistor, is obtained from the transistor literature. In the case of the 2N456As, for example, H_{fe} is given as 22. (minimum figure).

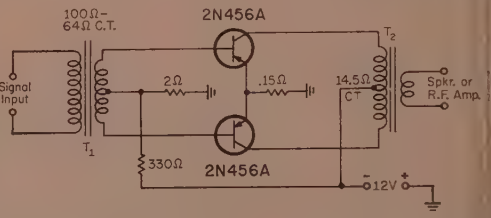

Fig. 17—A push-pull class B circuit suitable for a modulator is shown above. With the output impedance shown, the output is 20 watts, but can be increased by lowering the output transformer impedance as indicated in fig. 15.

Now, $R_{c\text{-}c}$ was previously calculated as 14.5 ohms for a 20 watt modulator and a 12 volt supply. The input resistance, h_{ie}, previously discussed, is 16. Combining these figures produces the following:

$$\text{Gain} = \frac{22^2 \times 14.5}{4 \times 16} = 109$$

$$\text{Drive power} = \frac{P_o}{\text{gain}} = \frac{20}{109} = .18 \text{ watts}$$

This is the driving power not taking into account the losses in the transformer. In practice, a driving power in excess of this figure would be provided, say .25 watts.

An amplifier capable of 20 watts output is shown in fig. 17. Simply by decreasing the resistance of the output transformer according to the formula shown earlier and fig. 15, an even higher power output may be obtained. ■

Clipper Squelch [*from page* 54]

The amount of negative voltage that appears at the grid of the 12DL8 indicates the presence of or lack of signal. With no signal the grid voltage is close to zero.

Note that the cathode of the diode section is tied to the plate of the triode section and as a result the applied voltage to the cathode of the 12DL8 diode is the sum of the 12 volt A supply and the drop across R_2. Since the polarities of the two voltages are series opposing, the drop across R_2 will reduce the positive voltage on the cathode. With no signal at the control grid, the 12DL8 triode section will have a high plate current causing a large voltage drop across R_2. This will cancel the major portion of the 12 volt positive cathode bias on the 12DL8 diode section

Terry Sterman
W9DIA

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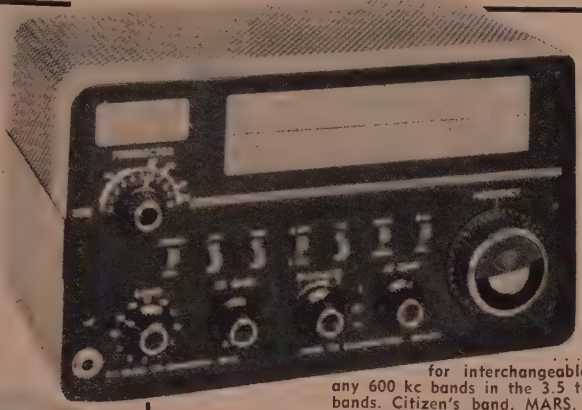

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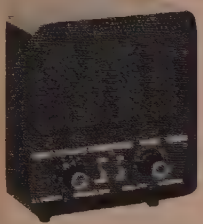
Ham Net $279.95 — Low as $9.92 per month



Model 2BQ Combination Q-Multiplier and Deluxe Speaker for notching heterodynes or single signal CW.
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Model 2-AC 100 kc Crystal Calibrator $16.95 Am. Net

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1) Model 2-B Communication Receiver SSB, AM, and CW	$279.95	$25.20	$13.74	$9.92
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3) Model 2-BS Speaker	16.95	1.62	.81	.54
4) Model 2-BQ Q-multiplier Speaker combo	39.95	3.53	1.76	1.26

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Terms above apply to three year contract. Minimum order financed for 1 year, $60; 2 years, $120; 3 years, $180. Persons signing time pay contracts must be 21 or over and employed.

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1-A Receiver	$169.00
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2-B Receiver	219.00

10% DOWN—Up to 3 Years to pay (two years on 1-A receiver)

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For further information, check number 18, on page 126

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WVG MARK II

New low cost vertical antenna which can be tuned to any amateur band 10—80 meters by simple adjustment of feed point on matching base inductor. Efficient radiator on 10, 15, 20, 40, 75 and 80 meters. Designed to be fed with 52 ohm coaxial cable.

Conveniently used when installed on a short 1-5/8" mast driven into the ground. Simple additional grounding wire completes the installation. Roof top or tower installation. Single band operation ideal for installations of this type. Amazing efficiency for DX or local contacts. Installed in minutes and can be used as a portable antenna.

Mechanical Specifications: Overall height — 18' Assembled (5' Knocked down) Tubing diameter — 1¼" to 7/16". Maximum Wind Unguyed Survival — 50 MPH. Matching Inductor — Air Wound Coil 3½" dia. Mounting bracket designed for 1-5/8" mast. Steel parts irridite treated to Mils Specs. Base Insulator material — Fiberglas impregnated styrene.

Electrical Specifications: Multi-band operation — 10-80 meters. Manual tap on matching inductor. Feed point impedance — 52 ohms (unbalanced). Maximum power — 1000 watts AM or CW-2KW PEP. Omni-directional. Vertically Polarized.

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Council Bluffs, Iowa

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Call_____
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City_____
State_____

For further information, check number 25, on page 126

and permit the diode to conduct thus presenting a low impedance. This will squelch the audio.

With signal at the control grid the negative voltage will reduce the 12DL8 triode plate current and reduce the drop across R_2. The applied positive bias on the cathode of the diode section will then rise to almost the full 12 volts effectively cutting it off and eliminating its shunt effect. The audio now sees an open path and is unsquelched.

It must be remembered, however, that when the squelch is open and audio is heard in the receiver, some noise will feed through with the carrier. This feed through noise will be kept at a minimum by the clipper action. In the absence of a signal, depending on the threshold setting, the receiver will be silent.

Installation

Now, how does this equipment connect into the existing receiver? It is very simple. All that is required is to solder the inner conductor of the shielded input lead to the hot side of the volume control. This point is designated *A* on fig. 1. The shield or outer conductor is soldered to ground. The 12 volt lead can be connected to the ON-OFF switch of the receiver. This is normally part of the volume control.

In some receivers where a delayed o.v.c. circuit is employed, or where the first audio stage is biased, it may be necessary to return the cathode of the first audio tube to ground. This is done simply by placing a jumper from the cathode to ground, thus shorting out the bias resistor.

Several typical installations are shown in fig. 2 and the steps necessary for proper connection. The dotted lines indicate that a jumper has been added and an arrow indicates the point at which the input of the squelch (point A) should be connected.

The gadget is simple and foolproof. The total cost of the squelch should not exceed $3.00—much less, of course, if you have parts on hand. ■

Air-to-Ground Phone [*from page* 102]

band, who was in an airplane, to her and how that message, coming partially through a receiver in her hospital room and then also relayed through this amateur to her nurse, had been the turning point in a severe illness.

"My mother, who dimly recalled the incident that happened to me in '24, didn't remember the name of the lady to whom the message had been relayed. She pressed the lady telling the story for more details and who do you suppose that lady was?—Yes, sir! She was Mrs. Harrison, the wife of the commander of the Bomber. Think of it! After all those years to get the low-down on the results of what, at the time, had been just a unique bit of radio relaying on my part."

Dick Russell sat almost speechless and then he broke out with, "Gosh, what a tale! That settles it. I'm not going to take any chance of

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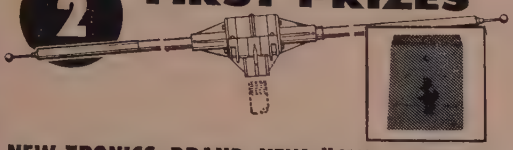

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2 SECOND PRIZES

NEW-TRONICS HUSTLER

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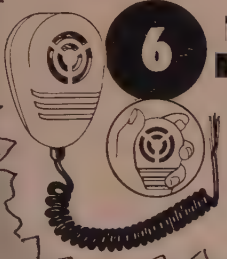

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WE HAVE EASY PAY TERMS, TOO.

For further information, check number 3, on page 126

MODEL DI-1 RF DISTORTION INDICATOR

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- Displays RF trapezoid or RF envelope patterns. Uses 3" scope tube with full mu-metal shield. Green filter provides unusually sharp display, even in bright light.
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Amateur Net Price	MODEL DI-1	$99.95
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P&H ELECTRONICS INC.
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For further information, check number 38, on page 126

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Reduces interference and Noise on All Makes Short Wave Receivers. Makes World Wide Reception Stronger. Clearer on All Bands!

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missing out on the chance of doing something like that. I'm going to study harder and say—when I get an outfit and my license—do you think I might get a chance to talk to a 707 flying overhead someday?"

"Not likely, Dick. But you'll be rewarded. Ham radio still pays off in thrills as well as for public service!" ■

Radio Classics [*from page 30*]

required for satisfactory class C operation, and the relation of a mode of operation to the resulting dissipation. Classes of operation described on the tube sheets take these factors into account, and thus the allowable inputs to the tubes do not increase in all classes of service as much as the increased tube dissipation would seem to warrant. It pays to at least consider the published ICAS "typical operating conditions" for a particular tube type before designing your own amplifier stage and basing the design on the allowable ICAS dissipation alone.

Military and other high-reliability use of tubes has had to move in the opposite direction from the CCS ratings. Many tubes (and other components) now are not recommended for service at more than 50% of CCS ratings. Other factors, such as applied voltages and driving currents, are also de-rated for very reliable use. A good reliability rule to follow, incidentally, is that higher quantities of parts in an equipment require higher reliability in each part. Thus, in practice, three ratings may apply to each tube.

(Author's note: The practice of "trying out" tubes to "see what they are good for", and tailoring the ratings for the service is economically justifiable, and is a good example of ham pioneering that showed the tube manufacturers an increased market for an existing product. This practice is continuing.) ■

Announcements [*from page 12*]

3. Other comments proposed that the northern boundary of the restricted area in California be modified to read latitude 37° 10′ North to permit the area immediately south of San Francisco to be excluded from the restricted portion of the State of California. This modification to the proposed amendments was agreed upon by the appropriate Government agencies. No reply comments were received.

4. The Commission finds that adoption of the rule amendments, as proposed and modified, would contribute to a wider and more flexible use of radio in the Amateur Radio Service.

5. The Commission, in negotiation with the appropriate Government agencies, has reached an agreement whereby the Amateur Radio Service will be authorized to use the maximum input power permitted in this service in the band 420-450 mc/s except in certain designated geographical areas which are defined in the attached Appendix.

6. In view of the foregoing, IT IS ORDERED, pursuant to the authority contained in Sections 4(*i*) and 303(*c*), (*f*) and (*r*) of the Communications Act of 1934, as amended, that effective January 2, 1963, Parts 2 and 12 of the Commission's Rules are amended as set forth in the attached Appendix; and the proceedings in this

[*continued on page 127*]

AVAILABLE NOW
FOR SCHEDULED DELIVERY

COLLINS NEW 62S-1

VHF CONVERTER for 6 and 2 meters

The 62S-1 will more than double your frequency coverage. The 625-1 may be used to cover 49.6 to 54.2 mc plus 143.6; 148.2 mc. Provides transmit and receive functions in 14.0 - 14.2 mc range with the 32S, 75S KWM series. No cable changing when moving from HF to VHF.

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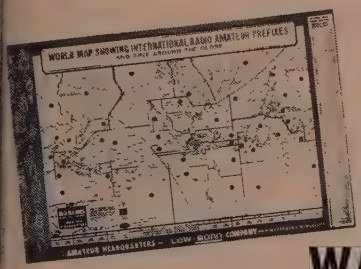

FREE!
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WORLD WALL MAP

Showing radio prefixes and time around the globe. Send 50c, in coin for this easy to use colored map. Enjoy the thrills and fun of contacting licensed stations all over the World. Fifty cents will be refunded with your next order. Use coupon on right to order your Model HT-41 Hallicrafter and World Map from Hamateur Headquarters.

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☐ I am enclosing 50¢ in coin, please send me large wall map. I understand 50¢ will be refunded with my first order.

☐ Place my order for scheduled delivery. Enclosed find $_____

☐ Send complete specifications on 62S-1.

Name_____ Call letters_____

Address_____

City_____ Zone____ State_____

For further information, check number 4, on page 126

NOW YOU CAN BUILD A FINE *Schober Organ* FOR ONLY $550

You can assemble this new Schober Spinet Organ for $550 — or half the cost of comparable instruments you have seen in stores. The job is simplicity itself because clear, detailed step-by-step instructions tell you exactly what to do. And you can assemble it in as little as 50 hours.

You will experience the thrill and satisfaction of watching a beautiful musical instrument take shape under your hands. The new Schober Electronic Spinet sounds just like a big concert-size organ — with two keyboards, thirteen pedals and magnificent pipe organ tone. Yet it's small enough (only 38 inches wide) to fit into the most limited living space.

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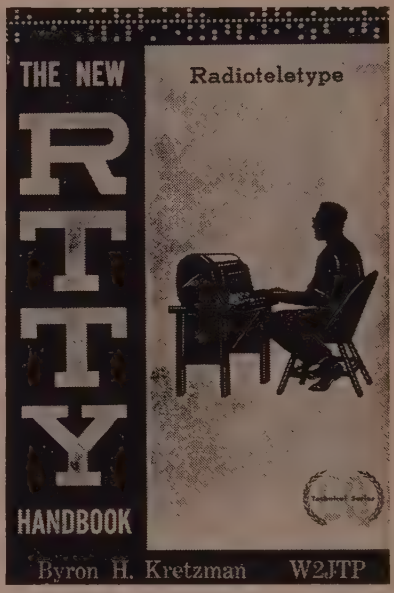
For further information, check number 34, on page 126

"THE NEW RTTY HANDBOOK"



A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP*, a well known authority in the field. This book is a must for your library! Only *$3.95*.

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C-A

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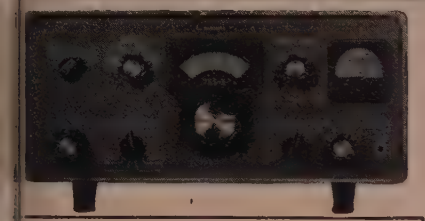

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We talked with a lot of bankers to bring this new low cost finance plan to Collins buyers. Finally we located an old established, conservative bank in northern Wisconsin. They're agreed to finance our sales of Collins gear without trade-ins at a maximum interest rate of only 5% . . . with just 10% down. You can't beat this deal! Take 1 or 2 years to pay the balance . . . FULL CREDIT for all finance charges if you decide to pay the balance anytime in the first six months! Important: this offer applies only to sales w thout trades. Order now . . . immediate delivery . . . plus our rock bottom low finance costs!

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MP-1 DC Supply	149.00	75A-4 Receiver	449.00
KWM-2 Transceiver	825.00	75S-1 Receiver	480.00
PM-2 AC Supply	109.00	75S-3 NEW DEMON.	545.00
30L-1 Linear	395.00	399C-1 VFO	124.00
30S-1 Linear	895.00	516E-1 Pwr. Supply	139.00
32V-1 Xmitter	159.00	516F-1 Pwr. Supply	74.00
32V-2 Xmitter	209.00	516F-2 AC Suppply	79.00
32V-3 Xmitter	295.00	For terms see page 108.	

	Amateur Net	1 yr.	2 yrs.
30L-1 Linear Amplifier	$ 520.00	$ 40.95	$21.45
30S-1 Linear Amplifier	1556.00	122.53	64.18
32S-3 Transmitter	750.00	59.06	30.93
62S-1 VHF Converter	895.00	70.48	36.91
75S-3 Receiver	680.00	53.55	28.05

	Amateur Net	1 yr.	2 yrs.
75S-3A Receiver	750.00	59.06	30.93
KWM-2 Transceiver	1150.00	90.56	47.43
KWM-2A Transceiver	1250.00	98.43	51.56
51J-4 Receiver	1464.00	115.29	60.39
51S-1 Receiver	1828.00	143.95	75.40
351D-2 Mobile Mount (KWM-2)	120.00	9.45	4.95
MP-1 14V DC Power Supply (KWM-2)	198.00	15.59	8.16
PM-2 Portable Power Supply (KWM-2)	150.00	11.81	6.18
CC-2 Carrying Case	85.00	6.69	3.50
CC-3 Carrying Case	107.00	8.42	4.41
516F-2 AC Power Supply (32S/KWM-2)	115.00	9.05	4.74
312B-4 Speaker Console (S-Line, KWM-2)	195.00	15.35	8.04
312B-5 PTO Console (KWM-2)	350.00	27.56	14.43
399C-1 PTO Speaker (KWM-2)	164.00	12.91	6.76
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This Low Finance rate applies only to new Collins Equipment purchased without a Trade-in. Offer is subject to withdrawal without notice.

NEED CASH?

We'll buy your ham gear for spot cash. Tell us what you have to sell and we'll rush our offer.

FACTS ON FINANCING

The terms shown here on this page apply to new Collins equipment only when purchased without trade-in. For some unknown reason, this bank does not like to handle transactions involving trade-ins. If you do have a trade-in, we can offer you one of the best trade-in deals in the industry and our conventional finance plan, which is competitive. BUT: If you don't have a trade-in, for heaven's sake, take advantage of this low interest rate while the bank has lots of extra money to invest.

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Two Stores to Serve You

PLEASE SEND MAIL ORDERS TO MILWAUKEE STORE

SEND MAIL ORDERS TO OUR MILWAUKEE STORE,

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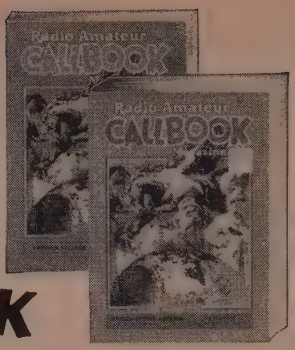
For further information, check number 40, on page 126

THREE IMPORTANT REASONS WHY YOU NEED THE

NEW 1962 WINTER

CALLBOOK



Foreign Listings (All outside U.S.) $3.00

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- If your present CALLBOOK is only a year old, over 20% of the listings have been changed or added!
- *Over 13,000 new amateurs added since the Summer, 1962 issue—another major license increase!*
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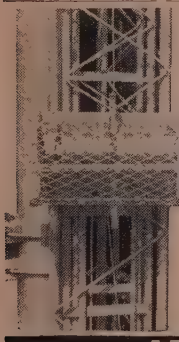
P.S. Write for illustrated brochure on exclusive WORLD ATLAS . . . DX GUIDE . . . SPECIAL FULL COLOR MAPS.



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When ordered with Tower. **$279.50** Am. Net.

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- Pull-down & Crank-up action
- Double worm gear drive
- Push button control

Write for details

E-Z WAY TOWERS, Inc.
P.O. BOX 5767 TAMPA 5, FLORIDA

HAVE YOU SEEN PAGE 6

Space [*from page 66*]

Name	Date Launched	Inclination to Equator (Degrees)	Period (Minutes)	Free (mc
VANGUARD I	Mar 17, '58	34.0	134	108.02
TRANSIT IV-A	Jun 29, '61	67.0	104	54, 150 324, 40
INJUN SR-III	Jun 29, '61	67.0	104	136.5
TIROS IV	Feb 8, '62	48.0	100	136.23 136.92
OSO I	Mar 7, '62	33.0	96	136.744
ARIEL I	Apr 26, '62	54.0	101	136.40
TIROS V	Jun 19, '62	58.0	101	136.235 136.922
TELSTAR I	Jul 10, '62	45.0	158	136.05
No Name	Sep 17, '62	82.0	90	108.09
TIROS VI	Sep 18, '62	58.0	99	136.235 136.922
ALOUETTE	Sep 29, '62	80.5	106	136.979
EXPLORER XIV	Oct 2, '62	33.0	2185	136.44
EXPLORER XV	Oct 27, '62	18.0	315	136.101
ANNA IB	Oct 31, '62	50.0	108	136.815

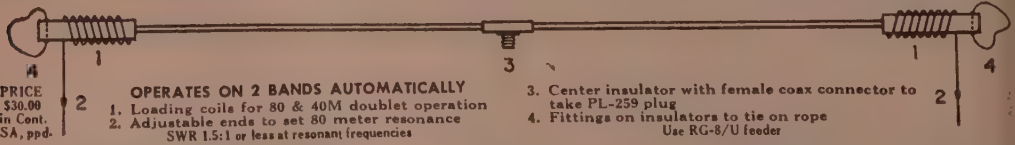
Outlook 1963

The outstanding success of TELSTAR and OSCAR II during 1962, and the significance they hold for the future, warrant enthusiasm. Important as they are, however, they are only experiments which in themselves do not represent the design of an operational communication system.

To hasten the development of an optimum *commercial* operational satellite communication system, the United States plans a variety of additional experiments during 1963. As many as four low- or intermediate satellites of the TELSTAR and RELAY active repeater types are expected to be placed in orbit during the coming year. It would require approximately forty of these satellites, orbiting between 600 and 9000 miles, to provide continuous communication on a world-wide basis. At least two high-altitude, synchronous, active repeater satellites are also expected to be placed in orbit during 1963. Called SYNCOM, these satellites would orbit at 22,300 miles, from where a fixed relationship would be maintained continuously with any point within a visible area equal to one-third of the earth's surface. Three such satellites would provide communications to almost every point on earth.

The U.S. plans to launch its second ECHO passive communication satellite early during the coming year. ECHO II, a rigidized 135-foot diameter balloon, will act as a giant man-made reflector of radio signals in the UHF and microwave regions. This will be followed later in the year with a REBOUND launching. REBOUND consists of several ECHO-type passive communication satellites which will be launched from a single rocket booster. It is planned to eventually design an optimum operational system from

LRL-70 ANTENNA 70' LONG, 80 & 40 M • Power rating 2 Kw. P.E.P. or ove



PRICE $30.00 in Cont. USA, ppd.

OPERATES ON 2 BANDS AUTOMATICALLY
1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance SWR 1.5:1 or less at resonant frequencies
3. Center insulator with female coax connector to take PL-259 plug
4. Fittings on insulators to tie on rope

Use RG-8/U feeder

Lattin Radio Laboratories Box 44 **Owensboro, Kentucky**

he detailed technical data obtained from the ctive and passive communication satellite ex-periments planned for 1963.

On the radio amateur side, steady progress continues on the development of OSCAR III. The third in the series of radio amateur satellites will be an active repeater, capable of relaying 2 meter signals across the country, and perhaps across oceans and continents.

The electronic circuitry for OSCAR III has been successfully developed. As reported last month, the repeater section is operating, on the ground relaying 2 meter signals in the San Francisco area. A solar cell power supply, and the package itself is now under intense development. At last reports, it seems almost certain that OSCAR III will be ready for launch before the middle of 1963. A successful launching for OSCAR III will make space communications for amateur radio a reality!

73, George, W3ASK

JSA-CA [*from page 70*]

he nation's most picturesque recreation areas worthy of inclusion in any western vacation trip.

B&O Has New 'Landscape'

The Balto. & Ohio R.R. Certificate sponsored by members of the B&O RR ARC, has revised Rules to meet rapidly expanding membership. New rules require working members after August 1, 1958. Certificate is given in three classes; CLASS C for working 10 members, CLASS B for 25, and CLASS A for 50. Club net meets on Wednesdays, 0530, EST, 3.930 kc. Send certified (GCR) list showing call, date, band/mode to Secretary, K3EHZ, Dorothea Witchey, Rt 1, Box 194A, Glen Burnie, Maryland. There is no charge but s.a.s.e. is appreciated. As majority of members are in Maryland, we will list the B&O award under Maryland in the *Directory*, per club request. Members are: **K2**LMS, **WA2**KAP, **W3**ABU, ADK, AHQ, AYV, BVL, CKA, DBU, DQN, FFO, HUR, HWU, IHQ, ILB, IXA, JFR, KCE, KWJ, LBC, LQW, QY, MAH, OKD, QIV, QOH, RME, VQE, **K3**ANJ, BHJ, PE, CKC, CHE, DHJ, EBQ, EHZ, EVM, GZK, HHN, PE, IAG, JDF, JOM, JTS, KHG, KJZ, KPS, KSS, LJB, XU, MBX, NYJ, ONU, OZO, QOL, RZR, **KN3**KQC, PED, **K4**AVY, AYI, PMW, **W8**AKQ, DXZ, FTN, FZJ, GWR, LWK, LK, QYY, RBE, RIN, SCZ, WYS, ZCW, **K8**BPK, GCW, RU, KZF, LNX, OVO, OXR, QYG, TCV, TVG, YPN, **KN8**OBI, YE, RHF, SRT, UAA, **W9**PIQ, PKQ, RUJ, YVS, **K9**GGO, SL, **KN9**BCT, SKE, ZZA & **WØ**NAG. See picture of B&O award.

What's Cooking Department

When we get down to here, we often wonder how much 'wordage' that New York Editor bloke will have 'chopped' to cram our non-technical news into his alleged "technical journal." We keep telling 'im you good folks would rather have him drop it

[*Continued on page 120*]

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Versatile • All-Purpose

ROHN Crank-Up Towers are especially engineered for amateur and experimental use. They represent the finest, most practical towers of their kind available. ROHN Crank-Ups feature (1) construction of welded steel; (2) hot-dipped galvanizing **after fabrication** throughout; (3) special roller guides between sections on SD & HD Series to eliminate friction for smooth raising and lowering. Also, ROHN towers assure uniform structural strength **regardless** of tower extension from highest to lowest height! Available in 37′, 54′, 71′, 88′, 105′ and 122′ heights. Prices start at less than $100.

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For further information, check number 18, on page 126

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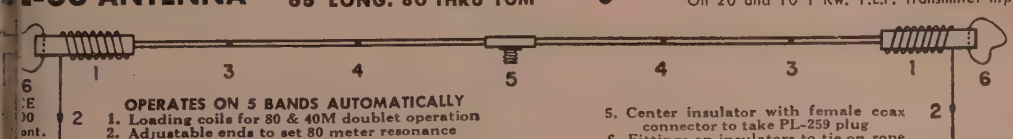
Power rating 2 Kw. P.E.P. or over on 80, 40, 15 On 20 and 10 1 Kw. P.E.P. Transmitter input



OPERATES ON 5 BANDS AUTOMATICALLY

1. Loading coils for 80 & 40M doublet operation
2. Adjustable ends to set 80 meter resonance
3, 4. Decoupling stubs for 20 & 10 meters
5. Center insulator with female coax connector to take PL-259 plug
6. Fittings on insulators to tie on rope

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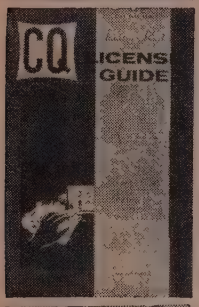

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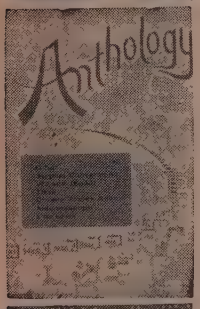
212 pages of everything the Amateur must have to get his license and progress toward the general class ticket. Plus many additional pages of vital information for the ham operator. All this for only *$2.50*.



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Most amateurs do not have a good file of back issues of *CQ*. So we've looked back through the years *1945-52* and assembled all in one place the articles that have made a lasting stir. The issues containing most of these articles have long ago been sold out. The price is a mere *$2.00*.

THE NEW RTTY HANDBOOK

A treasury of vital and "hard to get" information. Loaded with equipment schematics, adjustment procedures, operating procedures, etc. A valuable asset to both the beginning and the experienced RTTY'er. Special section on getting started, all written by *Byron Kretzman, W2JTP*, a well known authority in the field. This book is a must for your library! Only *$3.95*.

VHF FOR THE RADIO AMATEUR

You can't afford to be without this dynamic new handbook designed with the VHF amateur in mind. Filled from cover to cover with all new and original construction material presented so that you can understand it. Written by *Frank C. Jones W6AJF*, nationally acclaimed for his VHF pioneering. Available now for only *$3.50*.

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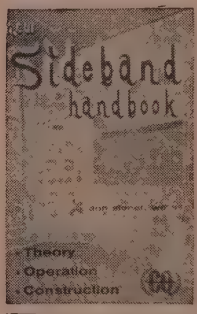
This is a collection of repr containing all of the available formation on the conversion of popular "Command" transmitters receivers into good ham transmi and receivers. Invaluable for No Technician, General, Advanced Extra class operators. 136 fabu pages, only *$1.50* postpaid.



SIDEBAND HANDBOO

Written by *Don Stoner, W6T* was almost one full year in the p aration of this terrific volume. is not a technical book. It expl sideband showing you how to along with it . . . how to keep y rig working right . . . how to k when it isn't . . . and lots of to build-it stuff, gadgets, recei adaptors, exciters, amplifiers. P only *$3.00*.

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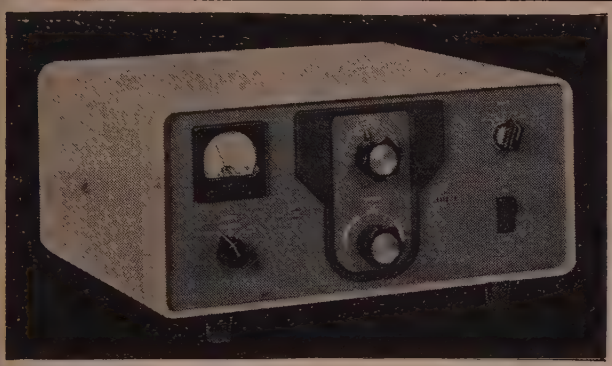
For further information, check number 26, on page 126



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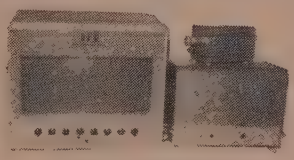

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HAVE YOU SEEN PAGE 6

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For further information, check number 30, on page 126

USA-CA [*from page* 117]

down to micro-print size rather than cut it. Can't complain though as he has let us expand from a half-page to quite a lengthy spread . . . all because so many of you nice folks wrote him you wanted "more." Don't let up on him.

Already in the hopper for next issue we expect to cover the Tennessee county award, WAT, plus the Tennessee King Cotton award previously mentioned in this column. Then there is a possibility of a new Pennsylvania county award by the Bucks County ARC; two prospective sponsors desiring to put Indiana in the spotlight; another Arne Trossman Plaque presentation, together with much other high-interest associated news in the making.

We wish to take this opportunity to thank all the good folks who wrote us encouraging letters during 1962 and sent us much good materials for this column . . . without which we could not have served you. Keep the news materials flowing this way in 1963, and remember, one good action picture is worth a thousand words . . . also, remember, when sending sample copies of certificates for possible publication, we have absolutely no use for mutilated ones or those that are disfigured by the words "SAMPLE" written across the face. Those that have sent such mutilated copies will never get a pic caption from us. If any have been guilty of such act, we suggest new copies be sent. And a word of journalistic advice; most writers keep a ready file of prop materials which might fit appropriate timing for publication . . . as for instance, we held the Montana awards picture coverage to break it with the North and South Dakota awards programs. If you have not sent in reproducable sample copies of amateur radio awards sponsored in your state, by all means do so. You can't lose and you might just get some top-level publicity as the USA-CA column unfolds.

Okay mates, the word has been passed for January . . . . again, A Prosperous New Year Filled With Hamdom Fun And Satisfactions, and God Bless All You Wonderful Folks. The OLD MAN, K6BX.

Sideband [*from page* 72]

sary confirmations and authenticated by the *CQ* SIDEBAND Editors, will be announced in this column. Go to it, boys; these trophies are really special and will never be duplicated!

N.Y. Sideband Dinner March 26, 1963

The 12th Annual Sideband Dinner will take place in New York City on Tuesday, March 26, 1963. Under the enthusiastic chairmanship of Stan Rosenberg, WA2GFV, plans are going ahead full steam to make this Dinner outdo all others in the past. As usual, there will be exhibits of the newest and best in sideband equipment and accessories; a unique opportunity to meet many of your sideband contacts; a superb dinner; and the best in entertainment. Further details in later columns but we wanted you to get a head start on getting your gang together and making plans to meet in New York City.

Incidentally, the SSBARA, which sponsors these Dinners, has been undergoing re-organization and is planning a new format. To those members who may not already have been notified, the organization's publication *The Sidebander* has been temporarily suspended. Any information about the organization may be obtained from the President, Irv Binger, W2CMM.

Remember the date—March 26, 1963! Join us and thousands of your fellow sidebanders and have the time of your sideband life at the 12th Annual Sideband Dinner.

Heard and Worked In The U.K.

Thanks to Reg Cherrill, G3HQO, who is President of The "EX 'G' " Radio Club and Editor of its interesting

monthly bulletin, we reprint a portion of an article by Norman, G3FPK.

"Thought you chaps might like to know what DX we hear and work, and when, so here is a brief resume. The times are all GMT, of course, and the remarks are confined to the 20 meter band. From 0600—maybe earlier, but I'm never around to find out—to about 1000, we point the beams North to the Pacific and have been rewarded with KB6, KH6, KL7, KM6, KS6, KW6, VR3, and VR5. Also we hear the W6's and W7's as well as those of you in the middle and east of the States who have insomnia! In the Winter, we used to work many VK's and ZL's over the long path across South America, but this circuit is dead for the time being. From 1200 through 1900, the Far East often comes in quite well and we beam between North-East and East for this, and a little further to the South-East for the VS9's, *etc.* Prefixes heard and worked include AP5, CR9, MP4, VS9, VU, 4X4, and 9M2. This path would appear to be open around 0600 as well since G5KW/JY when recently in Jordan, put in a colossal signal. From 1600 through 1900, the Southern African stations are usually good and CR7, VQ1, VQ2, VQ4, ZS, and 5H3 are regularly worked.

"The North American stations begin to come in at 1100 to 1200 as soon as they get out of bed, it seems, though signal strengths are less than they are later in the evening. From dinner time onwards, the North, Central and South American boys come through in fine style, with the Caribbean stations also well to the fore. The ones more consistently worked are FG7, PJ2, TG, TI, VP2, VP7 and VP9, with the occasional XE for good measure. A growing number of European s.s.b. operators are seeking refuge in the 14.100-14.140 slice to escape the phenomenal QRM from the kilowatt alley boys and the inevitable phone patch nets at the high end of 20."

We've often wondered who was working what in various parts of the world and, thanks to Norman, we now have a complete picture of conditions in the U.K.

73, Dot and Irv

VHF [*from page 76*]

I like it—the HyGain six and two meter Duo-Bander antenna, that is. Their model DB-62 is one of the slickest to come down the pike in a long time. I've had the 62 up for some time now and believe it is an excellent investment for the ham (like me) who doesn't have room for an antenna farm. Through an ingenious series of traps and rod lengths the antenna resonates on both bands with an s.w.r. of less than 1.5 to 1. The coupling system into the radiating element eliminates the extra feed line and only one length of RG-8 or RG-58 is required. The actual gain on six seems to be about the same as a three element beam while on 2 meters the performance is comparable to a twin-five. On both bands there are more and stronger major lobes, but this is the price you must pay for a dual band system. Particularly appealing to me is the light weight and small size. The 8.5 lb. structure can be carried up your tower with one hand. The boom length and longest element are only 10 feet. Another feature is the fact that it is preassembled. You simply flip it open like a television antenna! Although the beam looks like it lacks ruggedness, don't let appearance fool you. With a wind area of only 0.57 sq. ft. and a loading of 11.7 lbs. at 80 m.p.h., the HyGain Duo-Bander will stay up there for a long time.

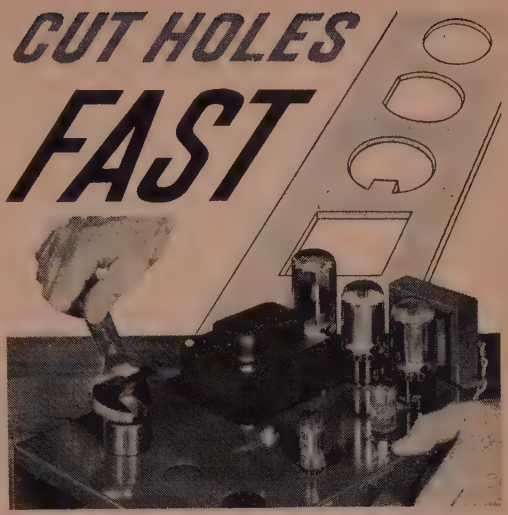
VHF Around the States

From the "Michigan Open Mike"—Do you know what a bee sting on top of a mosquito bite is called? Sting along with itch!! Phew!

Art Summers, W7HPG, is gung-ho for high power on the 420 band- as are many of his friends- but he wants it to include the A5 mode. (No reason why not-) Art also wonders what ever happened to facsimile on 10 meter legislation (don't know, Art, that's not v.h.f.- hi).

Walt, K1RTS, up in Waterbury, Conn., advises us that his club, the WWA, picked up eight ARC-4's and should have them fracturing the airways on two meters shortly. V.h.f. activity in the area slacked a little right after the ARRL-VHF contest. According to Walt, the fellows from the second call area that went up to Mr.

[*Continued on page 125*]



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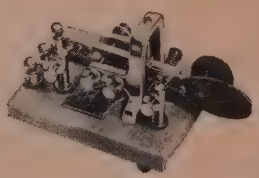

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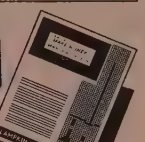

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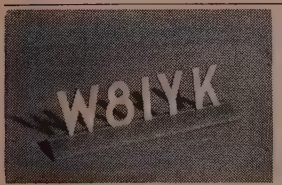

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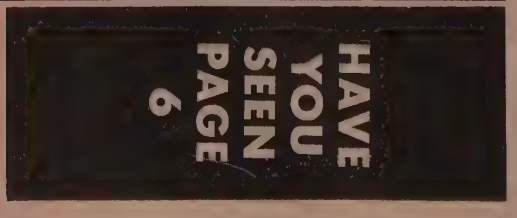

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BUILD: Any construction article appearing in handbooks, CQ, QST or 73. High quality parts and workmanship. Satisfaction Guaranteed. Write for a bid: Servotronic Instruments Inc., W5JFJ and K5OOR, Box 12441, Houston 17, Texas.

VALIANT, professionally wired, like new $275. K2BUS, 238-73 116 Rd., Elmont, L. I., CU 5-8589.

A-1 RECONDITIONED equipment. On approval. Trades, Terms. Hallicrafters S-107, $69.00; S-85, $79.00; SX-99, $99.00; SX-100, $179.00; SX-111, $149.00; SX-101A, $229.00; Hammarlund HQ-100, $119.00; HQ-110, $169.00; HQ-170, $259.00; Collins 75S-1, 75A-4, 32S-1, National, Gonset, Elmac, Heath, Johnson, RME, many others. Write us for lists. Henry Radio Company, Butler, Missouri.

WANTED: One DX-35 operating manual. Alvin W. Latta, K8DHJ, 1809 Clark Ave., S.W., Canton 6, Ohio.

SELL—Eldico-SSB 100F—$375.00 L-1001A with matching B&W power supply, extra transformer—$270. VFO-Matic for transceive operation with 9 mc exciter—$90.00—All perfect, F.O.B. Lamb, 1219 Yardley Road, Morrisville, Pa.

VIKING Ranger; excellent condx., factory wired, best offer over $200. Write Ronald Fitch (K2PWO), 1960 St. Paul St., Rochester 21, N. Y.

TO SETTLE estate: Gonset G-76 transceiver model 3338, Serial 1209; Gonset power supply G-76AC Model 3349, Serial 1015; Multi-Elmac AF-68 Trans-Citer serial 10171; Multi-Elmac Power Supply No. 678; Numerous accessory items. Best offer. Write Harvey J. Lambert, Attorney, Box 131, Ada, Okla.

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EXCEPTIONAL BUY 144w usb-lsb-a.m.-c.w. transmitter, Eldico SSB 100A, features: 1" scope, 100w output, VOX-QT, 10-80 v.f.o., excellent condition; Manual. Demonstration my QTH, on the air, best reasonable offer takes it. Also; 3.1 kc mechanical filter, trade for 0.8 kc, 1.5 kc, or cash or else. Phone patch, Sonar, Hybrid-type, cash or else. Paul R. Temmer, 423 Ave M, Brooklyn 30, N. Y. ES 7-2741.

FOR SALE Hammarlund Receiver, brand new, with speaker, HQ-170, $350. Harold VanLoh, 311 E. 6 St., Burkburnett, Texas.

FOR SALE National NC-303 with six meter converter, Astatic 77 microphone, crystal calibrator, Bud oscillator. Sell as a package $350. Cash or cashier's check. John Petters, 6360 Bryant Rd., Ludington, Michigan.

WANTED Commercial or Surplus Airborne, Ground, Transmitters, Receivers, Testsets, 618S, 18S, 17L, 51R, ARN-14, GRC, PRC, ARC-27, ARC-33, ARC-34, Others. Ritco Box 156 Annandale, Va.

ATTENTION Everybody Buy! Sell! Swap equipment through "Equipment Exchange Bulletin"! Many interesting offers, Sample copy free! Write: Brand, Sycamore, Ill.

COLLINS 75A-2 Central Electronics Slicer Mod. B $295. Excellent for all modes of reception. W2OZA, J. Talyor, R1B 199 Mt. Kisco, N.Y.

FOR SALE Army surplus BC-610E transmitter. Fair condition. Will sell to best offer. K4BWU, Box 6103, Clemson College, Clemson, S.C.

75S-1 $375.00; 516F-2, new, $90.00; KWS-1, extras, $875.00; P&H LA-400C, $139.00; 75A-4 mechanical filters 800 cycle, 1.5 kc, $45.00, 3.1 kc, $32.50. W7WGA.

I HAVE a good clean Gonset G-63 receiver complete wtth manual for sale for $150.00. It is in like-new mechanical and electrical condition, and does not have a scratch on it. Full specifications of receiver in March 1960 CQ. I will answer all inquiries. James H. Demler, WØDSU, 318 Garfield Ave., Hastings, Nebraska.

COLLINS 31L-1 linear amplifier, Drake Q multiplier with speaker, both brand new, and Paco 5" scope, excellent, no scratches—all three $475.00. Collins 32S-1 with a.c. power supply and built-in speaker, 75S-1 with factory noise blanker, both 2 years old, perfect, no scratches, the pair $945.00. Whole works $1395.00. Dr. Nelson Murray, W4MBM, Phone EV 9-2297, Jacksonville, Fla.

RME 4530A receiver, immaculate, described Sept. 1958 QST, $160. RME VHF 2-11 receiver for 2, 6 and 10; includes 2m cascode preamplifier; FB for Technician or Novice; $60. Ship anywhere, WA6QIC, 1849 Middleton Ave., Los Altos, Calif.

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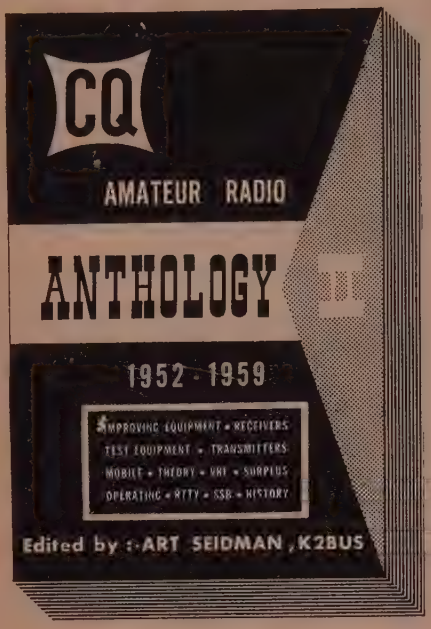

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VHF [*from page 121*]

Equanox, Vermont put a fine signal into Waterbury and they were doing nicely DX-wise. RTS also says he monitored Astronaut Scherra on 15 mc and was surprised that he was so strong (5-6).

Dale Schermuhorn, W7JCU/4, 126 General Bullard Dr., Mobile, Alabama, reports a 144 mc opening that occurred on Sat. evening, October 6. Dale reports working the following stations: K4CYC in Tampa, Fla., WA4EBN in Clearwater, Fla., W5BAU in New Orleans, W4DTO in Bradenton, Fla., K4PBP in St. Petersburg, W4ADRJ in Winterhaven, K4IXC in Melborne, W4MNT in Orlando, K4LJW in Tampa, K4SGR in Warrington, K4YVJ and K4FTI of Pensacola, and WA4BYR in Englewood. Dale runs 250 watts phone and 300 watts c.w. to a pair of 4X250B's driving an 11-element yagi up in the air 60 feet. The rig on fone is Taylor Super Modulation with about 5 watts of audio.

Bill Kerwin, VE1AHK, brings us up to date on v.h.f. activity in his neck of the woods where activity is going great guns. There are about 20 stations near New Brunswick alone and a lot of activity in the other areas which he has no trouble in QSO'ing any night of the week. Bill runs 5 watts to an eleven element beam up about 60 feet on two meters. The receiver is an International converter feeding a Hallicrafter S-108 receiver. With the set up he worked two US stations and is in the process of building a higher power rig with a pair of 826's in the final. Anyone who would like a sked can drop him a line at 14 Peters St., Saint John, New Brunswick, Canada. Bill says that school is cutting his operating short but he manages to get on as much as possible.

Irving Reynolds, W2EZL, 35 Elm Tree Lane, Pelham Manor, N. Y., is shutting down his six meter rig at Pelham Manor after three years exclusively on six. He is looking for a mountain top location in Vermont for work on six and two and wonders if anyone has any suggestions.

W4BUZ wishes to announce that promises are now a reality after much hard work on mixers. He now has a full 2 kw p.e.p. s.s.b., 1 kw c.w. linear on two meters feeding 16 elements of Telrex for 18.6 db gain up 46 feet. The transverter is fed by an Eldico SSB-100F filter rig. A 2C51 crystal oscillator-quadrupler is used to obtain a 130 mc signal which is fed into a 5763 mixer, 6AU6 voltage amp. at 144 mc. This is followed by a 5763 and 5894 ZL linear which is used for low power local work or to drive the PP 4X250B's. The front panel has six meters (moving coil type meters that is) on it. Power is derived from three separate all semiconductor 90, 300 and 2,000 volt supplies.

That pulls our chain for another 30. Don't forget to keep the news, letters and photos coming. The address at the head of the column will reach me fb. 'Til then, see you.

73, De Don, W6TNS

RTTY [*from page 80*]

Campbell, California, has a Model 15, an HT-32, and 100 watts on 2 meters.

W1AW RTTY Bulletins

We are sorry to report that the rumor, apparently started about October, that W1AW, the Maxim Memorial Station of the ARRL, was about to transmit their Official Bulletins on RTTY is without foundation, according to Ed Handy, W1BDI, Communications Manager. Ed says that W1AW is simply not sufficiently staffed to be able to punch tapes for RTTY as well as for Morse.

Does anyone know where a surplus Morse to 5-unit code converter can be found? Seriously, there are such thing. In the absence of such devices in the surplus market, we would like to suggest that one of our computer-oriented readers design and build a converter that would work from the taped Morse signals from W1AW. Any takers?

73, Byron, W2JTP

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Docket ARE HEREBY TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION
BEN F. WAPLE
Acting Secretary

APPENDIX

2. Section 12.111(*b*)(14) is amended to read as follows:

§12.111 Frequencies and types of emission for use of amateur stations.

* * * * *

(14) Within the following areas, the d.c. plate power input to the final stage of the transmitter shall not exceed 50 watts, unless expressly authorized by the Commission after mutual agreement, on a case-by-case basis, between the Federal Communications Commission Engineer in Charge at the applicable District Office and the Military Area Frequency Coordinator at the applicable military base:

(i) Those portions of Texas and New Mexico bounded on the south by latitude 31° 53′ North, on the east by longitude 105° 40′ West, on the north by latitude 33° 24′ North, and on the west by longitude 106° 40′ West;

(ii) The entire State of Florida, including the Key West area and the areas enclosed within a 200 mile radius of Patrick Air Force Base, Florida (latitude 28° 1′ North, longitude 80° 43′ West), and within a 200 mile radius of Eglin Air Force Base, Florida (latitude 30° 30′ North, longitude 86° 30′ West);

(iii) The entire State of Arizona;

(iv) Those portions of California and Nevada south of latitude 37° 10′ North, and the areas enclosed within a 200 mile radius of the U.S. Naval Missile Center, Point Mugu, California (latitude 34° 09′ North, longitude 119° 11′ West).

3. Section 12.131 is amended to read as follows:

§12.131 Maximum authorized power.

Except for power restrictions as set forth in §12.111, each amateur transmitter may be operated with a power input not exceeding 1 kilowatt to the plate circuit of the final amplifier stage of an amplifier-oscillator transmitter or to the plate circuit of an oscillator transmitter. An amateur transmitter operating with a power input exceeding 900 watts to the plate circuit shall provide means for accurately measuring the plate power input to the vacuum tube or tubes supplying power to the antenna.

Handicap Net

Ray Meyers, W6MLZ, ARRL Southwestern Division Director has organized a net for handicapped amateurs. Certificates will be issued to those who participate. Ray has also prepared a list of handicapped amateurs and if you know of someone who may not be on the list let him know. Donations will be used to build gear for the blind, *etc.* Contact Ray through Box R, San Gabriel, California.

Florida

As a contribution to our Government's effort to attract and favorably impress visitors from abroad, the West Palm Beach Radio Club is offering "Friendship to Foreign Amateurs." Amateurs visiting the Palm Beach area from other countries are invited to inspect facilities of nearby operators, take part in club activities, and take short tours with club members. When in Palm Beach or a near-by town, radio amateur tourists should contact the project chairlady, Eleanor D. Hope, W4CIL. Ellie's address is P. O. Box 96, Loxahatchee, Fla., and her phone number is OV 3-2652. West Palm Beach Radio Club is looking forward to a busy tourist season.

Pennsylvania

The Windjammers Radio Club will hold its annual banquet on Saturday, January 26th, in Hometown, Pennsylvania. A large crowd is expected and FCC examinations will be held. Fran Ugolick, K3PGZ will fill you in on the incidentals. Her QTH is 220 Green Street, Tamaqua, Penna.

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For further information, check number 8, on page 126

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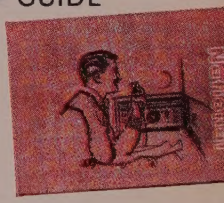

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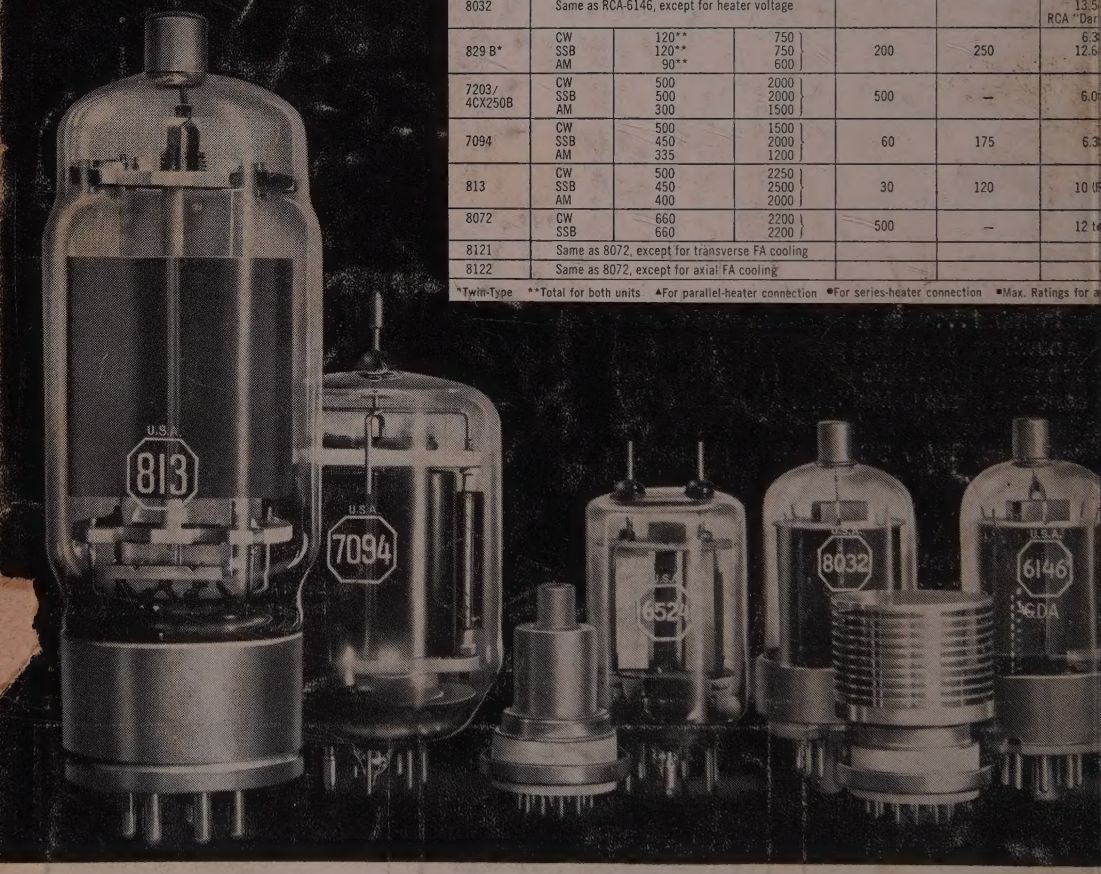
RCA Type	Class of Service	Max. Plate Input Watts▪	Max. DC Plate Volts▪	Max. Freq. for full Input (Mc)	Max. Useful Freq. (Mc)	Heate Filam V
8077/7054	CW	9.9	300	40	—	12 to
5763	CW AM	17 15	350 300	50	—	6.0
6417	Same as RCA-5763, except for heater voltage					12.6
7905	CW AM	18 15	300 250	175	—	6.3 quick-h
7551	CW AM	24 17.5	300 250	175	—	12 to
7558	Same as RCA-7551, except for heater voltage					6.3
2E26	CW SSB AM	40 37.5 27	600 500 500	125	175	6.3
2E24	Same as RCA-2E26, but has quick heating filament					6.3
6893	Same as RCA-2E26, except for heater voltage					12.6
832-A*	CW AM	50** 36**	750 600	200	250	6.3 12.6
807	CW SSB AM	75 90 60	750 750 600	60	125	6.3
6524*	CW SSB AM	85** 85** 55**	600 600 500	100	470	6.3
6850*	Same as RCA-6524, except for heater voltage					12.6
4604	CW	90	750	60	175	6.3 quick h
6146	CW SSB AM	90 85 67.5	750 750 600	60	175	6.3
6883	Same as RCA-6146, except for heater voltage					12.6
8032	Same as RCA-6146, except for heater voltage					13.5 RCA "Dar
829 B*	CW SSB AM	120** 120** 90**	750 750 600	200	250	6.3 12.6
7203/4CX250B	CW SSB AM	500 500 300	2000 2000 1500	500	—	6.0
7094	CW SSB AM	500 450 335	1500 2000 1200	60	175	6.3
813	CW SSB AM	500 450 400	2250 2500 2000	30	120	10 (F
8072	CW SSB	660 660	2200 2200	500	—	12 to
8121	Same as 8072, except for transverse FA cooling					
8122	Same as 8072, except for axial FA cooling					

*Twin-Type **Total for both units ▲For parallel-heater connection ●For series-heater connection ▪Max. Ratings for a



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